NETWORK WORLD
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MasterCard plans image net strategy

By Jim Brown
Senior Editor

NEW YORK — MasterCard International, Inc. last week announced a plan to deploy imaging systems at MasterCard member banks to reduce the cost and time it takes to settle charge card disputes.

The MasterCom program will enable banks to determine whether a customer or a merchant should be held responsible for disputed charges and help trim the more than $200 million a year that member banks pay in administrative costs to resolve disputes.

Under MasterCom, MasterCard is installing microcomputer-based image workstations at banks across the U.S. The workstations will enable banks to use MasterCard's Banknet, a private packet net, to exchange images of charge slips signed by customers at merchant locations.

Charge slips are needed to resolve disputes involving questionable charges on customers' accounts. To settle disputes, the customer banks use a Banknet terminal to request copies of charge slips from merchant banks.

With MasterCom, the merchant banks will be able to transmit images of charge slips to the customer banks via Banknet. The images will enable banks to

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PHOTO ©1989 COURTESY NORTHROP CORP.

B-2 Stealth bomber cruises over California desert on its maiden run.

B-2 flies through design stage with CAD/CAM net

Northrop network connects design stations to machine tools, eliminates need for prototypes.

By Wayne Eckerson
Staff Writer

PICO RIVERA, Calif. — The maiden voyage of the B-2 Stealth bomber was made possible in part by an advanced CAD/CAM network Northrop Corp. built to develop the controversial boomerang-shaped aircraft.

The network enabled engineers at Northrop's B-2 Division and at several B-2 subcontractors to generate components directly from three-dimensional computerized designs, eliminating the time-consuming and expensive process of developing operational prototypes.

The net also enabled Northrop to design parts, many of which require tolerances as small as one-thousandth of an inch, with greater accuracy.

During assembly of the B-2 bomber, 90% of the parts fit together on the first try, compared to the 60% typically experienced with conventional manufacturing procedures.

Northrop has spent about $1 billion of its own money on equipment and plant facilities since 1983 to support the B-2 program, much of it going to establish network links to approximately 200 B-2 suppliers and to develop leading-edge software

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US Sprint says AT&T illegally lured user

Carrier contends AT&T packaged services with equipment, asks FCC for damages up to $9m.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — US Sprint Communications Co. filed a complaint with the FCC last week alleging that AT&T lured away one of its customers by offering a contract that illegally bundled transmission services and equipment.

US Sprint, which is asking the agency to order AT&T to pay damages that could run as high as $9 million, said it has affidavits and letters proving that AT&T illegally won the business of Service Corp. International (SCI), a nationwide provider of funeral services based in Houston.

SCI was a US Sprint WATS customer until late last year, when it solicited new bids for its business from US Sprint, AT&T and MCI Communications Corp. The company was spending about $2.4 million annually with US Sprint but guaranteed it would nearly double spending to $4.2 million under the new contract.

SCI signed its pact with AT&T in early April, one day after the long-haul carrier filed a promotional tariff at the Federal Communications Commission seeking to provide free equipment to new users of its Megacom, Megacom 800 and Software-Defined Network (SDN) services beginning May 25. After examining it for almost two months, the FCC rejected the promotion as unlawful, ruling that it violated FCC rules prohibiting the bundling of equipment and services.

In addition to allegedly bun-

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INSIDE

Microsoft's Mike Murray lays out LAN Mgr. plan, page 8.

E-mail nets pose hidden legal issues

By Wayne Eckerson
Staff Writer

Exxon Co. U.S.A. is coming under fire for destroying electronic messages and files after the Alaskan oil spill, a striking example of the perils involving the storage and handling of electronic documents and messages.

Most corporations have policies governing how long paper documents must be retained, but few have explored whether these policies are adequate for handling electronic missives.

Moreover, most companies are unaware of laws governing law enforcement access to electronic documents and whether employers have the right to read messages written by employees.

"As electronic documents continue to proliferate, prudent and sensible companies will reevaluate their records manage-

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NEWSPAPER

FEATURE

Medical arena focuses on image communications

MANAGEMENT UPDATE

Mary Johnston
Special to Network World

Medical health science centers, such as university medical school/hospital complexes, will lead the way in determining the shape of the image communications networks of the future.

Communications users within these centers are often early experimenters with leading-edge technologies. They cooperate with vendors to develop capabilities that benefit the medical care, teaching and research environments. Image capture and analysis — in the form of X-rays, ultrasound, nuclear medicine, tomography and magnetic resonance imagery (MRI) — are essential for quality medical care and state-of-the art biomedical research.

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DEC discusses its strategy for VAX Rdb/VMX system

Company sees data base management system as a gateway to other vendors' computers.

By Jim Brown
Senior Editor

BOSTON — Digital Equipment Corp. last week said it is positioning its VAX Rdb/VMS relational data base management system as a gateway that will enable DECnet users to access and download data from DBMSs on other vendors' computers.

At a briefing held here to outline its DBMS strategy, DEC said it plans to enable the VAX-based Rdb to extract data from the DBMS that is built into the OS/400 operating system of IBM's Application System/400 minicomputer and IBM's SQL Data System DBMS on VM-based mainframes. The company will add other vendors' DBMSs to the list over the next few years.

DEC already provides software called Vida that enables Rdb users to extract data from Cullinet Software, Inc.'s Information Center Management System DBMSs on MVS-based mainframes. DEC recently announced Vida for DB2 software that allows Rdb to extract data from IBM's DB2 on MVS-based hosts. Vida uses the DECnet SNA Gateway and IBM's LU 6.2 protocols to link VAXes to IBM hosts.

Rdb is a part of DEC's 18-month-old Network Application Support (NAS) program, a blueprint for building applications that can interoperate even though they run on disparate systems. To ensure interoperability with other vendors' DBMSs, Rdb supports an ANSI-standard implementation of SQL that defines how data is exchanged between DBMSs.

DEC will expand on Vida by developing Vida upgrades that enable Rdb users to update files on IBM hosts, according to Marco Emrich, senior product manager for data base systems. Currently, Vida and Vida for DB2 only enable Rdb users to download copies of mainframe data.

While concentrating on mainframes, DEC also recently bolstered its Rdb data access tools with SQL Services software that enable DECnet-supported microcomputers to access Rdb data.

SQL Services runs on MS-DOS-, Ultrix- or VMS-based microcomputers and enables users to request data from Rdb, or other vendors' DBMSs through Rdb, using English language commands.

SQL Services translates commands to SQL queries and for-

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Software lets Novell users support OS/2 applications

NetWare Requester now supports Named Pipes.

By Susan Breidenbach
West Coast Bureau Chief

PROVO, Utah — Novell, Inc. last week announced software that supports a key Microsoft Corp. LAN Manager communications feature, enabling OS/2 workstations on a NetWare net to run distributed OS/2 applications.

The software, NetWare Requester for OS/2 Version 1.1, implements the Named Pipes interprocess communications facility, allowing OS/2 applications to communicate with one another across a NetWare network.

The initial Named Pipes support comes in a new version of the NetWare Requester shell, software that runs on an OS/2 workstation and enables it to direct requests across a network to a NetWare file server. DOS-based workstation users on NetWare networks will have to wait until later this year for a Named Pipes facility for their workstation shell, the company said.

Named Pipes is the facility in Microsoft Corp.'s OS/2 LAN Manager operating system that enables a process executing on one computer on a local network to communicate with a process running on another machine.

The immediate benefit the new NetWare Requester for OS/2 1.1 offers NetWare users is the ability to integrate Sybase, Inc.'s SQL Server, which runs on OS/2, into the NetWare environment.

"Very few users are prepared to base their whole networking strategy on OS/2, but some are interested in having OS/2 workstations or OS/2 application servers and the benefits they provide," said Mark Calkins, vice-president of marketing for Novell's software group.

SQL Server, a back-end data base engine marketed by Ashton-Tate Corp. and Microsoft, uses seven of the Named Pipes to communicate across a network with front-end applications running on workstations. The most visible OS/2 application to emerge so far, SQL Server currently runs only on LAN Manager networks.

LAN Manager is not yet widely installed, so the NetWare support

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Briefs

Dumping decision. The U.S. Department of Commerce last week made a preliminary determination that imports of small business telephone systems from Japan, South Korea and Taiwan are being sold in the U.S. market at less than fair value.

The Commerce Department has placed antidumping duties on imports, mainly key telephone systems, that are sold for less in the U.S. than they are in their country of origin. The department began its dumping investigation on Dec. 28, 1988, after AT&T and Comdial Corp. filed a petition on behalf of U.S. industry. AT&T said it was satisfied with the decision. The department will make a final determination on the dumping issue in the fall.

MCI leads a charge. MCI Communications Corp. last week announced an agreement with Visa U.S.A., Inc. that would allow customers to charge domestic and international long-distance calls to their Visa credit cards. Cardholders participating in the program, dubbed Visaphone, will place calls by dialing an 800 number and then entering the number desired, their credit card number and a personal identification number. MCI will forward the charges for calls to Visa, which will provide billing and collection for the calls. MCI officials said this was the first such agreement between a major long-distance carrier and a credit card company.

As the worm turns. A federal grand jury last week indicted Cornell University graduate student Robert Morris Jr., charging him under the 1986 Computer Fraud and Abuse Act, which makes it illegal for anyone to gain unauthorized access to federal computers. Morris allegedly unleashed a computer virus last November in the Internet network that affected thousands of computers nationwide. If convicted, Morris faces a maximum of five years in prison and a $250,000 fine.

Debit debacle. A group of 12 states last week filed suit against MasterCard International, Inc. and Visa International, Inc., charging them with violation of antitrust laws. The suit alleges that MasterCard and Visa bought stakes in Cirrus Systems, Inc. and Plus Systems, Inc., respectively, to head off plans by those companies to offer debit cards. The suit said that both companies feared use of debit cards would chew into profits made from credit card usage. MasterCard and Visa deny any wrongdoing.

US West plans ISDN demo. US West Communications, Inc. last week said it will team with customer premises equipment vendors to demonstrate live Integrated Services Digital Network applications at the next North American ISDN Users' Forum meeting, slated for Oct. 9 to 12 in Phoenix.

US West ISDN Product Manager Bob Meldrum said the RBHC and the vendors will make several selections from the NIU Forum's most recent list of emerging ISDN applications. The chosen applications will be showcased at the users group meeting.

Data conferencing, personal computer-to-personal computer file transfer, screen sharing and local net briging are among the applications Meldrum said he expects to be demonstrated.

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IEEE group mulls potential of twisted-pair token ring

May choose one vendor's version for standard.

By Laura DiDio
Senior Editor

VANCOUVER — The Institute of Electrical and Electronics Engineers has formed a study group to examine the feasibility of adopting a standard for both 4M and 16M bit/sec token rings running over unshielded twisted-pair wire.

The group's efforts to forge a standard for high-speed token-ring nets running over telephone-type wiring could help legitimize the market by establishing a common implementation of the technology.

While 16M bit/sec token-ring products running over twisted pair are attractive due to their low wiring costs, differing implementations have already sprung up. Standardizing the technology would help protect user investments.

Vendor participants in the IEEE 802.5 Unshielded Twisted Pair (UTP) study group, which met for the first time here recently, include IBM, AT&T, Proteon, Inc., Ungermann-Bass, Inc., SynOptics Communications, Inc., Western Digital Corp., Cabletron Systems, Inc., NCR Corp. and David Systems, Inc.

The standards unit will meet several times over the next few months, according to Al Marshall, a Proteon vice-president chairing the group.

The group plans to study the technical feasibility of different vendors' implementations of the technology and may eventually agree upon one to submit as a draft standard, Marshall said.

Bob Campbell, an engineer in AT&T's Computer Networking Group in Middletown, N.J., and a member of the IEEE 802.5 study group, said, "There's no question that you can do high-speed token-ring transmissions on telephone wire." The real challenge, he added, is to produce a standard that limits noise and radiation emissions and ensures multivendor interoperability.

> "We're seeing growing demand for unshielded twisted pair," Campbell said.
>
> ▲▲▲

Campbell said AT&T is investigating whether to offer such a product. "We're seeing growing demand for unshielded twisted pair in token-ring nets," he said.

Last week, Proteon announced a 16M bit/sec token-ring product that uses unshielded twisted-pair wire ("Proteon preps novel 16M token-ring net," *NW*, July 24).

Proteon President Patrick Courtin said his company overcame the problems of noise interference and electromagnetic emission by developing passive filters for its workstation adapters and wiring concentrators.

By filtering the signal at both ends of the cable and balancing the wire to reduce signal jitter, Proteon said it has been able to limit electrical radiation and prevent external noises and vibrations from degrading signals.

Proteon's implementation accommodates hub-to-workstation wire runs of up to 300 feet. The company recommends a 72-node limitation on a single token-ring net, as compared to the 256-node limitation using shielded wire.

Ungermann-Bass, Cabletron and SynOptics have said they will also offer 16M bit/sec token-ring products that use unshielded twisted-pair wire.

In contrast to Proteon's passive filtering method, Ungermann-Bass has said it will deliver an electrically powered hub that achieves the high speed by processing signals.

Change of heart

IBM, which is also a member of the committee, previously maintained that it is not practical to run high-speed networks on unshielded wire. But the company has softened its stance recently.

"Yes, it can be done," said Bob Love, a senior engineer in IBM's Communications Systems Group. "But what the specific implementations are and how good they are has to be tested and evaluated." Love represents IBM on the IEEE 802.5 committee.

Protracted GTE-HSN battle could go to jury this week

By Bob Brown
Senior Editor

CLEARWATER, Fla. — Home Shopping Network, Inc.'s (HSN) $1.5 billion fraud and misrepresentation lawsuit against GTE Corp., which has been in litigation here since June 19, could go to the jury as soon as this week.

Top executives from both HSN and GTE have been called to testify in the 6-week-old trial, which has included everything from physical scuffles between opposing lawyers to an attempt by HSN to get the judge to remove himself from the case.

At issue is whether the network equipment and services GTE provided to HSN in the mid-1980s failed to work as promised and caused HSN to lose $500 million in business.

HSN, which is based in St. Petersburg, Fla., is seeking $500 million to cover lost revenue and another $1 billion in punitive damages.

A countersuit, in which Stamford, Conn.-based GTE has charged HSN with slander and libel, is being heard simultaneously by the same jury here in the Pinellas County Courthouse.

HSN, which markets merchandise via its broadcast television network, claims that the GTE Omni call distribution system blocked 42 million, or more than 50%, of its customer calls between February 1986 and May 1987.

HSN also argued that GTE employees knew of the shortcomings but failed to alert the company. GTE countered that its telecommunications equipment and services performed as promised and that HSN's management was to blame for the problems.

Last month, GTE had HSN President Lowell Paxson on the stand to ask him why he never informed GTE in writing of his company's intentions to buy as many as 14 television stations in an effort to expand the company's customer base by 28 million homes.

HSN ran into problems, GTE argued, because it chose to acquire a call distribution system that did not fit its growing needs and that required callers to be put on hold. HSN also failed to hire enough operators, GTE said.

HSN Chairman Roy Speer and former GTE Florida, Inc. President William Starkey have both spent almost every work day for the past six weeks in court, conducting business via mobile telephone in between answering lawyers' questions.

Starkey claimed GTE advised HSN to explore a backup network strategy, even if it meant buying the services of another carrier or vendor.

"Our position was that we wanted to do what's right for the customer," said Starkey, now head of GTE Information Services, Inc. "We're not in business for the onetime sale."

Judge remains

Last week, HSN asked Pinellas Circuit Court Judge Howard Rives to remove himself from the case for alleged biases demonstrated through body language and statements. The request was denied.

The case has taken its financial toll on the adversaries. GTE's countersuit claims its business

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Microsoft's Murray airs LAN strategy

Mike Murray recently joined Microsoft Corp. as director of Microsoft's Networking Business Unit after an 18-month stint with workstation maker Convergent Technologies, Inc., but he is perhaps best known as the marketing genius behind Apple Computer, Inc.'s Macintosh campaign.

Murray talked with Network World *West Coast Bureau Chief Susan Breidenbach last week about the challenges Microsoft faces in spurring acceptance of its LAN Manager network operating system.*

Analysts say LAN Manager sales have been disappointing. Why aren't more users embracing the product?

We set timing expectations incorrectly. One of the lessons I learned at Convergent is that there is a delay associated with any new product that goes through an OEM channel.

Even a fairly simple product takes six to nine months from the time it is introduced before it gets into users' hands. Our OEMs are selling LAN Manager into large accounts where it has to be integrated into an existing corporate computing environment, and that type of purchase has a very long cycle to it.

Microsoft has the right foundation to build on, and we now have to establish the right set of expectations. The LAN business is at its beginning; Novell has a very large share of a very small part of the potential market.

As a marketing challenge, what does Novell's current dominance really represent?

There is a great advantage in being the absolute leader because of the ability it gives you to influence the market.

In networking, we are the underdog right now. Novell has been out there eight years; they've got a good product, and they've done a good job servicing customers and building their channel. They've been operating almost in a vacuum, though, with no real competition.

Is it possible that this vacuum has given NetWare an insurmountable lead?

Absolutely not. The average network today has eight people and is not being used for a lot of sophisticated computing. People are sharing printers, disk drives and, only sometimes, files. The challenge is to get more and more people connected and to connect ideas, not just computers with wires. Nobody has even begun to scratch the surface here.

The next generation of network operating systems will provide users with transparent access to information across an enterprisewide network. That's when we'll see a quantum leap in productivity.

At Microsoft, we have to pick the five or six key features that will distinguish this next-generation product and come up with a standard set of [application program interfaces] for developers. That will give us a very strong product offering that is differentiated from what Novell is able to offer in the same time frame.

With the increasing focus on functionality, is there any chance that we've heard the last of all those arguments about network performance?

Depending on the day of the week and the different tests you can run, LAN Manager and NetWare are almost at parity in terms of performance, so we need to relegate performance arguments to the back seat.

Users will come to see both products as super fast and say, 'Let's stop talking about performance and start talking about more interesting issues like how to connect my enterprise.' We just need to make sure our current generation of products continues to get to the market on schedule so we will be at parity with Novell in terms of product features as well.

What can we expect to see in Microsoft's next-generation LAN Manager?

We need to show next-generation improvements in interfaces for the system administrator. When you really get into the dynamics of selling networks, the administrator becomes the key.

We need to improve the administrator's user interface with tools that make it easy to set up new users, manage security and tune the system.

Shouldn't there be more distributed applications for LAN Manager by now?

We got the exact same criticism at Apple after the Macintosh was released. 'Where is all the software?'

Then, as now, developers were dealing with new technology, breaking new ground. This kind of thing takes a long time. We have a boatload of [independent software developers] who are writing client/server applications for LAN Manager and SQL Server. We have certainly not failed in attracting ISV [independent software developer] resources.

In another six to 12 months, I think we will see some fantastic applications coming out that will blow people's minds.

Is SQL Server starting to drive LAN Manager sales?

The most exciting product to me is not SQL Server itself, but a

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The Best-Known Unknown Name in Telecommunications.

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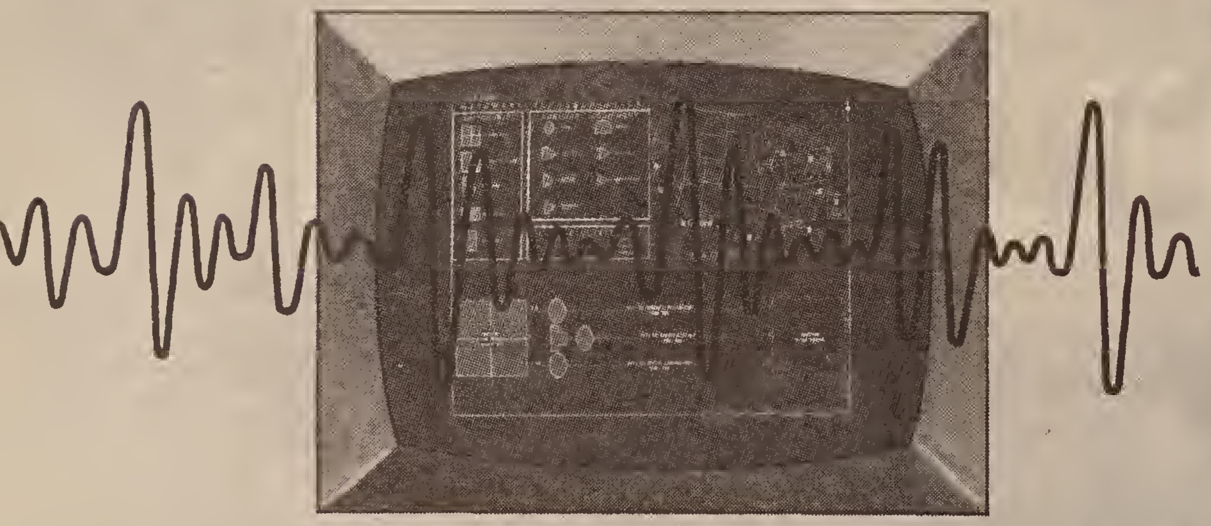
"Westinghouse Communications can offer businesses like yours our user's perspective, global resources, unmatched experience, and expertise. We can help you create exactly the telecommunications system you need, not the one other companies want to sell you."
Harlan Rosenzweig

Harlan Rosenzweig

President
Westinghouse Communications

Get the system you need. Not the one someone else wants to sell you.



The fact is, most vendors simply don't have the comprehensive capability to offer a true "total solution" for many businesses' telecommunications requirements.

But Westinghouse Communications is different.

Westinghouse Communications is staffed by telecommunications veterans who have interacted for more than 25 years with a wide variety of vendors throughout the world. Our staff's vendor-independent approach provides you with advanced technical expertise in communications, plus the day-to-day support necessary to develop and maintain *flexible* systems. Systems that not only fit your needs today, but also evolve as new technology is developed.

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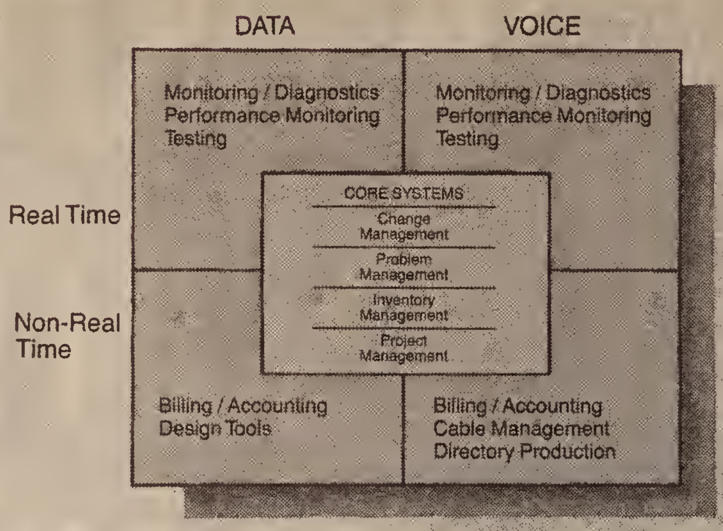

	DATA	VOICE
Real Time	Monitoring / Diagnostics Performance Monitoring Testing	Monitoring / Diagnostics Performance Monitoring Testing
Non-Real Time	Billing / Accounting Design Tools	Billing / Accounting Cable Management Directory Production

CORE SYSTEMS
- Change Management
- Problem Management
- Inventory Management
- Project Management

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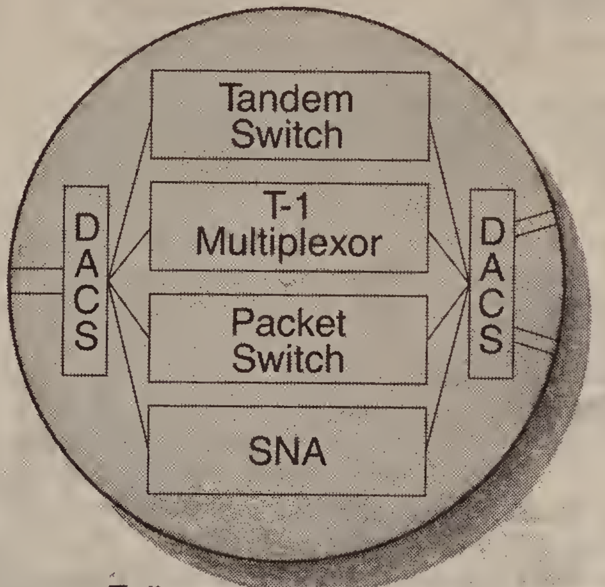
Network Services

- Switched voice
- Packet switching
- Bulk data transport
- SNA Networking
- Electronic Mail
- Electronic Data Interchange
- Facilities Management Services
- Service Bureau processing
- Data base design and creation

Fully Integrated Voice / Data Network Features

- Network management
- International access
- Data base access
- Supercomputer access
- Access to other vans



Fully Integrated Network Node

Systems Integration

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Because many suppliers approach telecommunications from the limited perspective of their particular hardware or software, they invariably fall short of the real objective of true systems integration. This often forces users to integrate their own systems. But only a select few can do it because many companies lack the staff needed to design, build, and manage these increasingly sophisticated networks.

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You can be sure... if it's Westinghouse

Communications

Latin rival slaps COMSAT with suit seeking $1.5b

By Bob Brown
Senior Editor

NEW YORK — Pan American Satellite Corp. (PAS) last week filed an antitrust lawsuit against Communications Satellite Corp. seeking $1.5 billion in damages, claiming the company attempted to put it out of business.

PAS, which provides international satellite services to Latin America and Europe, charged COMSAT with fixing prices at unfairly low rates and with conspiring with its international counterparts against PAS.

COMSAT sells U.S. firms access to the global satellite network run by the 117-nation, nonprofit International Telecommunications Satellite Organization.

In a complaint filed in federal court in New York, the Greenwich, Conn.-based PAS estimated it had lost $500 million worth of business over the past year, an amount that would be tripled for compensation to PAS under antitrust statutes if the court finds against COMSAT.

The suit also seeks a permanent injunction against COMSAT restricting the company from engaging in alleged anticompetitive practices.

A COMSAT spokesman labeled the lawsuit "completely without merit."

As a congressionally created company charged with carrying out U.S. national interests, COMSAT was required to support PAS' efforts in the mid-1980s to launch a satellite.

According to PAS Chairman Rene Anselmo, who formed PAS in 1984, "COMSAT/INTELSAT is blocking cheaper and better satellite communications services in order to line its own pockets and protect an outmoded monopoly."

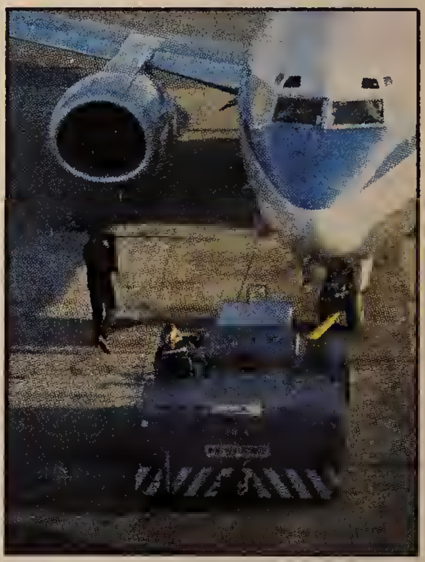
(continued on page 47)

Arinc tests new airline safeguards

By Barton Crockett
Senior Editor

ANNAPOLIS, Md.— A communications service provider to the nation's leading airlines is gearing up to pilot test several new services that promise to improve air safety and smooth operations at the country's major airports.

Among the services to be trialed by Arinc, Inc., a nonprofit consortium controlled by the country's nine largest airlines, is a satellite-based tracking system that would let air traffic controllers monitor transoceanic flights.



Other services scheduled to be tested include one that would forward weather information from inflight planes to the National Weather Service and an electronic data interchange service that would help speed air freight through U.S. customs.

Arinc is readying these services, in part, as an attempt to maintain its position as a leading communications service provider. Airlines and other communications providers are eyeing Arinc's markets as a potential source of revenue.

Lucrative pair

Nearly all of Arinc's roughly $64 million in annual communications service revenue is generated by two services. One is a messaging service offered over a terrestrial Arinc net that airlines use to exchange reservation network data, obtain credit card approvals and forward requests for fuel and equipment to suppliers.

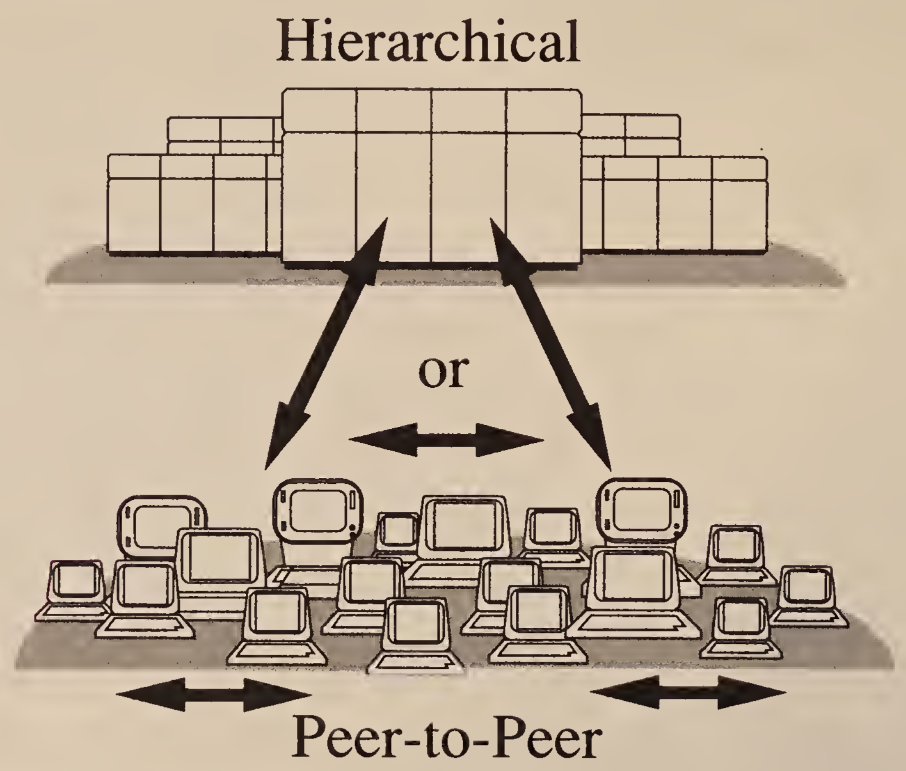
Arinc also operates an air-to-

(continued on page 48)

Introducing a new choice in wide area networking

SNA Access

Amdahl provides the new choice in wide area networking. Access to traditional hierarchical SNA networks and access for SNA peer networks from a single access processor -- the Amdahl Network Processor Series 2725 (NPS/2725).



The Amdahl NPS/2725 offers numerous advantages for a wide range of SNA network topologies. This includes: remote concentration, protocol conversion and enveloping, directory services, session activation, route selection services, resource contention, flow control, recovery, and error-free data transmission.

Amdahl Communications - the new choice in wide area networking.

Amdahl Communications, 1250 East Arques Avenue, M/S 276,
Sunnyvale, CA 94088-3470
1-800-544-5376 (within California, 408-492-1077) Department 274

amdahl
Communications

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

"It is our view that deregulation — in an era of market share stability, excess supply, and all major players having equivalent network quality, customer service and back office capabilities — could cause a price war to erupt, even though no industry participant wants one."

Joel Gross
Vice-president
Donaldson, Lufkin & Jenrette
Securities Corp.
New York

People & Positions

Peter Craine, formerly senior vice-president of worldwide sales for **Novell, Inc.**, last week was named executive vice-president for sales and marketing at **Alloy Computer Products, Inc.** in Marlborough, Mass.

Craine left Novell in April. His appointment follows on the heels of Alloy's recent appointment of former Banyan Systems, Inc. President Richard Meise as president and chief executive officer.

Alloy sells multiuser operating system software, personal computer boards for the software to run on and tape storage systems for the personal computer industry.

IBM's board of directors last week elected **Robert Ripp** treasurer and **Peter Schneider** a corporate vice-president effective tomorrow.

Ripp, who is currently assistant general manager for finance and planning of IBM Enterprise Systems, will replace **David Finley.** Finley will retire from IBM at the end of the year.

Schneider, currently IBM's director of systems and programming, has been elected vice-president of systems and programming. ◻

INTELSAT approves plans for Orion's net services

Competition comes to the transatlantic arena.

By Bob Brown
Senior Editor

ROCKVILLE, Md. — The International Telecommunications Satellite Organization's Assembly of Parties recently approved Orion Network Systems, Inc.'s plans to offer transatlantic net services over its own satellites.

The INTELSAT decision paves the way for Orion to offer private very small aperture terminal network services in Europe over its own network, giving INTELSAT its first major competition in the transatlantic arena.

The INTELSAT decision paves the way for Orion to offer VSAT net services in Europe.

▲▲▲

Orion, which already offers T-1 and 56K bit/sec services using capacity leased from INTELSAT, expects to offer a wider variety of competitively priced services once it has its own birds in the air. The company will market the services through Orion-Net, Inc., a marketing subsidiary.

Orion needed INTELSAT approval to build the network because the countries that belong to INTELSAT agreed in 1964 to restrict companies from building competing satellite systems.

Breaking down the barriers

INTELSAT is an international nonprofit cooperative of 117 member nations that operates 13 satellites around the globe and provides voice, data and video transmission services to countries, businesses and carriers.

Currently, INTELSAT has little competition in the international arena other than Pan American Satellite Corp., which last week filed an antitrust lawsuit against Communications Satellite Corp., the company that sells INTELSAT access to U.S. firms (see "Latin rival slaps COMSAT with suit seeking $1.5b," page 8).

Now that it has INTELSAT's approval, Orion hopes to finalize by mid-August a $352 million order with British Aerospace, Inc. to build and launch two satellites. Orion plans to have the Ku-band satellites in operation by late 1992 or early 1993, in time to take advantage of the new European trade policies expected to be in place by then.

(continued on page 12)

INDUSTRY BRIEFS

Microsoft Corp. last week reported earnings of $170.5 million for its fiscal year, ended June 30, an increase of 38% over the $123.9 million it posted for fiscal 1988.

Microsoft's annual revenue climbed to $803.5 million, up 36% over revenue of $590.8 million reported last year.

For the fourth quarter, Microsoft's earnings were $45.4 million, up 51% over earnings of $30 million in the corresponding period last year. Revenue grew to $220.2 million, rising 29% from last year's fourth-quarter earnings of $170.5 million.

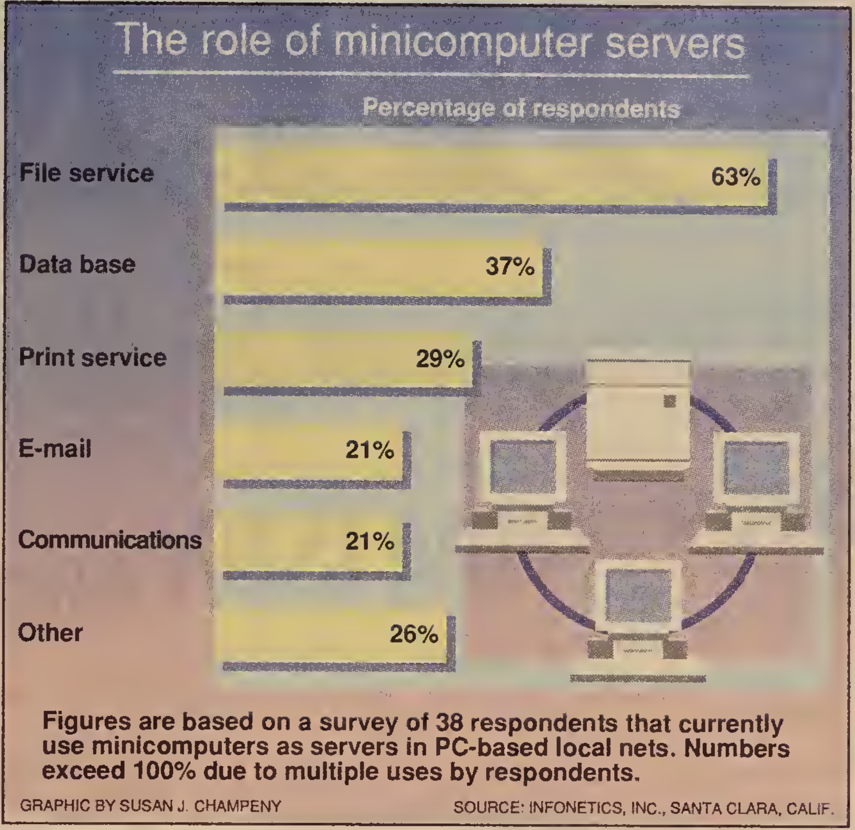
Microsoft cited strong international growth as one reason for the improved financial results. International operations accounted for 55% of the company's revenue for the year, up from 48% last year, said Jon Shirley, Microsoft's president and chief operating officer.

Ashton-Tate Corp. last week reported a net loss of $19.8 million for its second quarter, ended June 30, down from earnings of $11.5 million for the similar quarter last year. The company also announced the resignation of Luther Nussbaum, president and chief operating officer.

Ashton-Tate reported revenue of $59.5 million, down from revenue of $71.9 million for last year's second quarter.

The company attributed its net loss to reduced revenue and a write-off of about $8 million for product rights and obsolete inventories principally related to the Decision Resources, Inc. product line acquired in 1986. The reduced revenue is the

(continued on page 12)



Figures are based on a survey of 38 respondents that currently use minicomputers as servers in PC-based local nets. Numbers exceed 100% due to multiple uses by respondents.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: INFONETICS, INC., SANTA CLARA, CALIF.

Mini makers look to LAN arena for sales

In slowing market, vendors are positioning minis as newest high-performance local net servers.

By Gail Runnoe
Washington Correspondent

WASHINGTON, D.C. — The stagnant minicomputer market is forcing vendors to find new roles for their products in the exploding local network market.

Ideally, vendors would like to maintain the minicomputer's traditional role as a departmental system while also repositioning it as an application server for personal computer networks.

"Users are planning to use their minicomputers as servers in distributed networks" as they continue to move away from the terminal-based master/slave computing environments, according to Nina Burns, vice-president and senior consultant at Infonetics, Inc., a Santa Clara, Calif.-based market research firm.

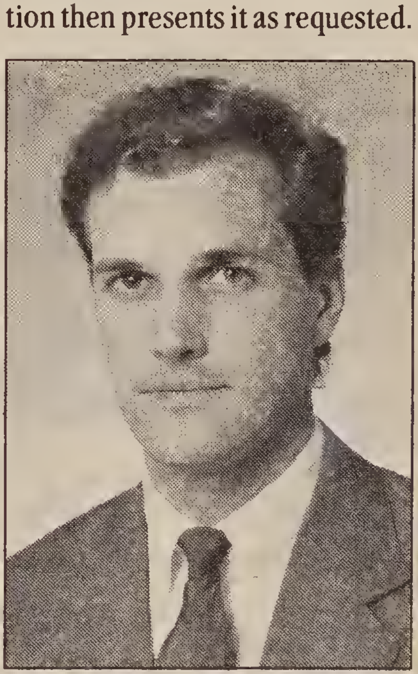
In a recent survey of 100 minicomputer users, Infonetics found that nearly 40% of the users were positioning their departmental hosts as high-performance local network servers.

On average, 44% of the minicomputers used at these sites were being used as servers.

Over the next three years, Burns said she expects even more minicomputers to be employed as local net servers to take advantage of their speed, high-capacity storage and ability to simultaneously handle several processing requests at once.

Minicomputers are also turning out to be the focal point of a whole new generation of distributed applications that include components for the minicomputer and a client component for each network workstation.

With the so-called client/server architecture, the workstation is used to assemble requests issued to minicomputer-based servers. The servers process the requests and send back only the required data, instead of a large block of raw data. The workstation then presents it as requested.



DG's Christopher Stone

Lee Doyle, a senior analyst at International Data Corp., a Framingham, Mass.-based market research firm, said the server market is new to minicomputer vendors but they could fare well as networks grow and demand for power mounts.

While the minicomputer market has slowed, Doyle said the local network market is growing at a 50% annual clip. This market, he said, "shows opportunity for

(continued on page 12)

The ISDN

Showcasing ISDN applications

BY JEAN S. BOZMAN
CW STAFF

SCOTTSDALE, Ariz. — AT&T last week drew major computer vendors into its quest for MIS and tele… support for ISDN techn…

After years of prepar… able to showcase Inte… Digital Network (ISDN) a… equipment from such main… dors as Tandem Computers, … Equipment Corp. and Wang La… Inc.

AT&T executives demonstra…

that gathers calls from multiple user locations — even those in an IBM Systems Network Architectu… can exchange… "You … ses- … vice- … ent. … nd … r

ISDN applications come alive at ICA

Dawn Bushaus, Assistant Editor

Vendors at the International Communications Association convention last week … telecommunications history when … demonstrated a live … work using

An ISDN Opportu…

EDITORIAL

When telephone companies and end users gathered in Scottsdale … earlier this month to get a firsthand look at what AT&T … industry-specific ISDN applications, they … live demonstrations of …

technology. But … Oddly enough, A… the consultant a…

What AT&T … attendees at Ne… program, AT&T … telecommunicati…

Admittedly, th… nity Program co… pense of providi… telephone servic… is a stro…

AT&T, others offer w… of ISDN products at d…

By John Cox
Senior Editor

SCOTTSDALE, Ariz. — AT&T last week demonstrated a battery of new and existing Integrated Services Digital Network products at NetPower '89, an exhibition designed … nesses …

features such as Incom… Line Identification. … $995, the product will … able in April.

NetLine, Inc … intr…

HOTEL USES ISDN TO STREAMLINE CHECK-IN SERVICES

The Harrah's Reno Guest Service Center uses ISDN and interactive live video to expedite guest reservations. It's a joint effort made possible by the hotel, Nevada Bell and AT&T.

GUESTS arriving at Reno's Cannon International Airport now can make instant reservations at Harrah's Reno by utilizing an interactive live video system.

It is the first time this technology has ever been used in the hospitality industry anywhere in the world.

While passengers are waiting for their luggage to arrive from the plane, they can check into Harrah's … make reservations for … range to … TV …

appear on the main screen in front of them.

Individuals using Harrah's … Guest Service Center who … about what type of room … look at all their choices on … TV screen.

Another touch is … tran…

ICA ISDN Demo: N…

EDITORIAL

There was a lot of talk and, actually, a lot of action about integrated services digital networks at the International Communications Association conference in Dallas last week … ICA ISDN showcase, … Bell Telephone Co., … of ISDN technology … the trouble to mention … 's West Ballroom … expected equipment and …

At times during the … Southwestern Bell tec… considered the impos… work, or, at the least …

Indeed, a week ago, … Microcom Inc. official… that the AT&T 5ESS … demo wasn't working … supports ISDN at M… Some fine-tuning wa… integrated song.

More than fine-tu… running for the …

AT&T confirms, expands ISDN commitments

AT&T To Let Telcos Offer Users Free ISDN

BY BETH SCHULTZ

SCOTTSDALE, ARIZ. — AT&T Network Systems last week said it will give its telephone company customers the chance to provide their users with free ISDN service on a trial basis.

AT&T introduced its Customer Opportunity Program at last week's NetPower '89 trade show here, which featured AT&T central office equipment and third-party supplied applications for integrated services digital networks (*CommunicationsWeek*, March 13).

AT&T Network Systems' new program is a two pronged offering that will let the company's Bell operating company and other telco customers introduce end users to ISDN—at AT&T's expense …

under which telcos, end users and AT… are developing ISDN…

Although AT&T's … ment was the centerp… NetPower event, it wa… highlight.

Robert Cooper, ente… rector with Rochester … Rochester, N.Y., said … NetPower are essential … out of the labs and int…

Rochester Telephone … interest in NetPower. … cent of its access li… AT&T 5ESS switche… tions AT&T put toge… are applicable to sev…

Roche… territo…

With … ious … develop… dealing … port, of…

'A 'try it; you'll like it approach' may be the …

AT&T To Spotlight 11 ISDN Appli…

BY BETH SCHULTZ

SCOTTSDALE, ARIZ. — AT&T Network Systems plans to showcase 11 new ISDN applications for telephone companies and business customers at the first NetPower '89 ISDN forum here this week.

Although AT&T in the past has been involved in forums covering integrated services digital networks, NetPower '89—AT&T's own event—is different, an AT&T spokeswoman said. The company will highlight industry-specific solutions it developed in cooperation with local telephone companies and third-party vendors, using off-the-shelf products.

"This is a way to explain to telcos and end users how ISDN centrex can make the PC [local area network] more productive," she said.

Each of the 11 applications will be demonstrated in settings that depict elements typical of that environment, including customer premises equipment. The security application, for instance, will include a security guard location, a security supervisor office and a central security database location.

… and software from AT&T, Compaq … Inc., Hilgrave Inc. and … data confer…

NETPOWER '89 PARTICIPANTS

Source: AT&T

… in research and development and … facilities. The vendors used … AT&T's

AT&T spokeswoman … In addition to the … demonstrations, 27 v… ble products. Some … for the first time a… ISDN products and …

Prodigy Services … its videotex servi… spokesman for th… With an ISDN c… could be transmit… telephone servic…

Although the … an ISDN switch … ing in NetPow… can do "ISD… delivering our…

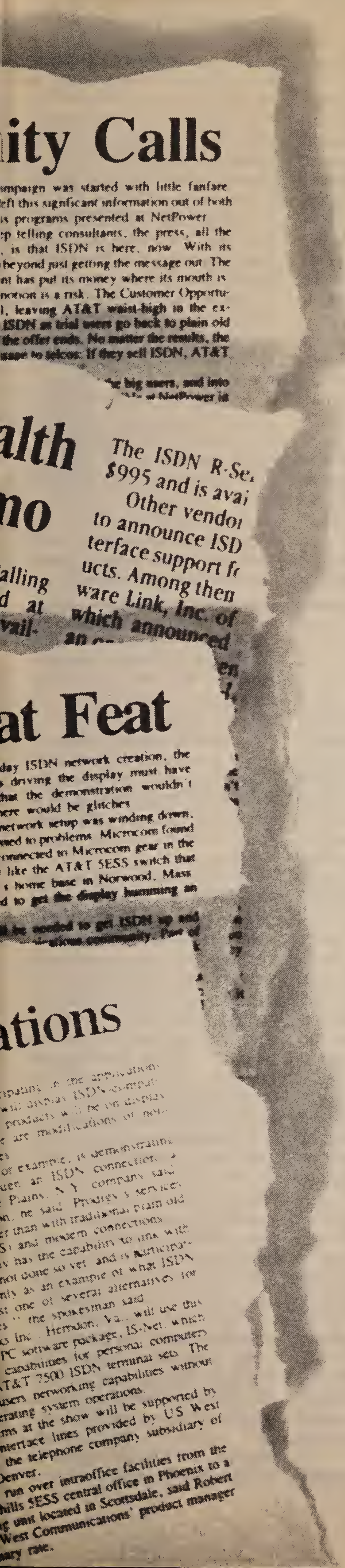
Newbridge … forum to show … provides nev… connected th… program giv… disrupting f…

The ISD… 150 Basic … Commun… US West…

The li… compan… remote … Meldr…

Scorecard

(Part 2)



ity Calls

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capabilities for personal computers
T&T 7500 ISDN terminal sets. The
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erating system operations.
ms at the show will be supported by
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the telephone company subsidiary of
Denver.
run over intraoffice facilities from the
hills 5ESS central office in Phoenix to a
g unit located in Scottsdale, said Robert
West Communications' product manager
ary rate.

Who's really putting ISDN on the map? If you've seen the headlines, you know the score.

You only have to scan the trade press to see who's the clear-cut ISDN leader. The company that helped build the standards for ISDN. The company that's helping local telephone companies turn the promise of ISDN into Real-World Solutions. The company: AT&T.

95% of ISDN lines are on an AT&T 5ESS® switch

AT&T Network Systems has helped more local telephone companies install more ISDN lines than any other telecommunications supplier—some 95% of non-trial ISDN lines. What's more, we've already shipped over 245,000 ISDN lines for future use.

Today, 148 central offices can offer operational ISDN services from the AT&T 5ESS switch—with 571 upgraded with ISDN software. Combined, these central offices have the potential to offer ISDN services to almost 9 million telephone company customers.

So, while most other suppliers are still in product development trials, AT&T Network Systems is helping phone companies across the nation offer Real-World ISDN services right now. Services such as simultaneous voice and data transmission, high-speed facsimile and electronic mail—all over a single phone line. Services that utilize your existing telephone network to dramatically increase productivity and efficiency for businesses, from hospitals and insurance companies to investment, publishing and law firms.

ISDN is just the beginning

We believe that ISDN is the beginning of an even bigger future. A future we call Universal Information Services. A future where networks will be able to meet complex communications needs for voice, data and image—simply and economically.

At AT&T Network Systems, this belief is already driving our technology, our product development, and our commitment to you.

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AT&T
The right choice.

RBHCs' financials reflect economy and competition

By Bob Brown
Senior Editor

Four regional Bell holding companies posted improved second-quarter earnings last week, while three others reported lower earnings than they posted for the corresponding quarter last year.

Southwestern Bell Telephone Co. showed the biggest improvement with its second-quarter earnings rising 22.8%, to $261.5 million on revenue of $2.14 billion.

The improved results reflect "dynamic growth in our cellular business and an improved Southwestern economy," said Zane Barnes, chairman and chief executive officer at Southwestern Bell.

US West, Inc., whose earnings fell 23%, to $258.6 million, reported the worst drop in earnings for the second quarter, compared with the similar quarter last year.

The tumble is actually attributable to a onetime after-tax gain of $88.7 million that the company took last year. The gain resulted from the sale of an initial public offering that amounted to about 19% of the stock of US West NewVector Group, a paging and cellular subsidiary that went public last year.

Excluding that gain, this year's second-quarter results represent a 4.4% increase in earnings on revenue of $2.4 billion.

"Our growth in earnings per share continues to come from our nontelephone operations, and we don't expect that trend to change," said Jack MacAllister, US West chairman and chief executive officer.

Nynex Corp. reported the largest revenue drop, while also experiencing a slowdown in earnings. The company's revenue sank 11.2%, to $3.3 billion, and earnings fell 13.6%, to $279 million, compared with last year's second quarter.

Nynex Chairman D.C. Staley said, "softness in the Northeast economy" plus "a downturn in the financial services industry and heightened competition" adversely affected the company's results. Competition from private corporate networks and the likes of fiber-optic carrier Teleport Communications of New York also hurt Nynex's financial results, a spokesman said.

Nynex operating company New York Telephone Co. has asked the New York State Public Service Commission to consider rate adjustments to offset lower than expected growth by the company.

RBHCs report 2nd-quarter results

RBHC	Revenue		Earnings	
	1988	1989	1988	1989
Ameritech	$2,477	$2,553	$351	$317
Bell Atlantic Corp.	$2,719	$2,882	$344	$361
BellSouth Corp.	$3,361	$3,468	$396	$418
Nynex Corp.	$3,166	$3,299	$323	$279
Pacific Telesis Group	$2,366	$2,407	$321	$325
Southwestern Bell Corp.	$2,033	$2,140	$213	$261
US West, Inc.	$2,251	$2,435	$336	$259

Figures are in millions of dollars

GRAPHIC BY SUSAN J. CHAMPENEY

SOURCE: RBHCS

Modest gains

Three RBHCs reported modest earnings increases for the second quarter. Among them was Bell Atlantic Corp., which said its second-quarter earnings rose 4.9%, to $360.8 million, and revenue climbed 6%, to $2.9 billion.

Strong growth in business volumes in the company's network services group, particularly local services and exchange access, contributed favorably to the improved second-quarter results, according to Raymond Smith, Bell Atlantic chairman and chief executive officer.

Pacific Telesis Group reported a modest 1.2% earnings gain, to $325 million, in the second quarter on revenue of $2.4 billion or an increase of 1.7% for the second quarter, compared with last year's second quarter. The company reported an extraordinary gain last year of $12 million from the sale of PacTel Spectrum Services to IBM.

According to Sam Ginn, chairman and chief executive officer for the carrier, Pacific Telesis' cellular business revenue more than tripled from $4 million in the second quarter last year to $13.5 million in the second quarter of 1989.

BellSouth Corp. experienced a 5.7% jump in earnings, to $418.1 million on revenue of $3.5 billion. John Clendenin, BellSouth chairman and chief executive officer, said revenue gains were tempered by recent rate reductions designed to help the company respond to an increasingly competitive market.

Ameritech saw earnings fall 9.9% for the second quarter, to $316.6 million, while its revenue climbed 3.1%, to $2.6 billion. Earnings fell in large part because last year's second-quarter earnings included a onetime gain of $42.1 million from the sale of Ameritech's interest in Cantel, Inc., a Canadian cellular company, to Rogers Communications, Inc. in Toronto. Excluding figures from the sale, net income rose 2.3% for the second quarter.

Industry Briefs

continued from page 9

result of lower than expected upgrade revenue and the company's previously announced joint program with its U.S. distributors and resellers to substantially cut distribution channel inventories.

The resignation of Nussbaum came as a result of differences in management philosophy, according to Esber, who will assume the additional title and responsibilities of president. The company has no plans to appoint a new president.

Compression Labs, Inc. last week announced that it has been chosen to provide **US Sprint Communications Co.**'s share of the videoconferencing capabilities for the government's Federal Telecommunications System (FTS) 2000 network.

Compression Labs gave no estimated value of the arrangement.

US Sprint said it plans to install hundreds of videoconferencing sites under the FTS 2000 contract over the next few years. The first two of these have already been installed: at the General Services Administration's FTS 2000 Service Oversight Center and the US Sprint FTS 2000 Network Management Center, both located in Virginia.

Compression Labs and US Sprint have collaborated on videoconferencing projects in the past, according to a Compression Labs spokesman.

Stratus Computer, Inc., a Marlborough, Mass.-based maker of fault-tolerant computers, last week reported second-quarter earnings of $9 million, up 34% from $6.7 million for the second quarter of 1988.

Revenue for the three months ended July 2 totaled $83.3 million, up 32% from $62.9 million in the previous year's second quarter. Stratus Computer made several communications-related product announcements during the quarter, including the DNS/2000, the first DECnet-compatible communications software available for Stratus' XA2000 Systems.

According to William Foster, the company's president and chief executive officer, Stratus Computer displayed "steady growth" both at home and internationally.

INTELSAT approves plans

continued from page 9

"Our primary focus all along has been to extend the benefits realized using VSAT networks in the U.S. to a much larger international marketplace," said Orion Chairman and Chief Executive Officer John Puente. "We see a growing demand for VSAT telecommunications in both the private and public sector — a demand that cannot be met either by transoceanic cable or conventional satellites."

Orion has been in "consultation" with INTELSAT for more than nine months in accordance with international agreements concerning competition. Orion's bid to build a transatlantic satellite network was supported in INTELSAT by the U.S. and U.K.

The meetings turned up several findings, including the fact that the networks could actually operate side by side without interfering with each other. The assembly also concluded that Orion's satellite network would cause significant economic harm to INTELSAT.

INTELSAT Director Dean Burch's executive staff estimated average annual revenue losses attributable to Orion's presence would range from 7.2% to 14% annually.

But INTELSAT consented to allow Orion to launch its satellite because of a number of assurances made by the U.S. and U.K., which reaffirmed their long-term commitment to INTELSAT.

The assurances exclude Orion from linking its facilities to the public switched networks in either area and restrict Orion to using a maximum of 33 36-MHz transponders.

INTELSAT's board of governors will address, on a priority basis, other issues related to Orion's and INTELSAT's commercial viability as they arise.

Steve Sazegari, senior industry analyst at Dataquest, Inc., a San Jose, Calif.-based market research firm, said Orion's move into the transatlantic satellite business is significant in that it could force INTELSAT to spruce up its network technologically.

"It's not that INTELSAT's service is bad; it's just that INTELSAT hasn't improved its technology as much as it could have," he said.

Increasing transatlantic competition from undersea fiber cables, of which there will be three by 1993, will cut into satellite use, Sazegari said.

Still, satellite service will continue to play a key role in allowing users to get to difficult-to-reach locations and to back up primary network services, he said.

Orion's victory could pave the way for other independent firms to apply to launch transatlantic satellites, Sazegari added.

Mini makers look to LANs

continued from page 9

new growth, new profits and new customers" for the minicomputer makers.

Although larger players such as IBM and Digital Equipment Corp. view the server market as just another growth opportunity, smaller companies such as Data General Corp. and Wang Laboratories, Inc. need the new business just to survive, he said.

DEC currently offers two network servers: the PC LAN Server 2,000, a MicroVAX 2000 packaged with server software capable of supporting eight to 32 users; and the PC LAN Server 3100, a MicroVAX 3000 packaged with server software that can support 10 to 50 users.

While these products are DEC's first packaged servers for local nets, the company said any VAX can be outfitted to perform server functions.

Sandy Waters, manager of business development for personal computer integration at DEC, said the benefit of using a VAX as a server is its ability to do "double duty." DEC's VAX/VMS Services, a layered software program able to run on any VAX, allows the VAX to act both as a network server and simultaneously support dumb terminals or personal computers emulating terminals, he said.

Although IBM's Application System/400 minicomputer can function as a server in personal computer networks, the company said the AS/400 was never positioned for that function.

Lacking the installed base of larger vendors, DG, Wang and Prime Computer, Inc. have focused their server efforts on partnerships and alliances with established network operating system vendors.

DG, for example, has teamed with Novell, Inc., Microsoft Corp. and Madge Networks, Ltd. to develop Unix-based systems that run on local nets supporting NetWare and OS/2 LAN Manager, according to Christopher Stone, group manager of distributed applications architecture at the company. "We're working with all three vendors to maximize customer choices," he said.

Wang signed an OEM contract with Banyan Systems, Inc. last year under which Wang resells Banyan's VINES network operating system for its LS line of servers that operate on Wang's Intel Corp. 80286- and 80236-based processors. Wang is expected to later produce a similar server running on its VS minicomputers.

Prime Computer joined forces with Novell early this year to develop Unix-based versions of NetWare that, among other things, would enable Prime's EXL supermicrocomputers to function as servers for Portable Netware. The EXL can support 40 to 45 users.

TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

A telecom planner's rule of thumb: At any one instant 1/7th of a company's employees are on the telephone. Of that group, 1/7th are involved in calls outside the local exchange. Of that group, 1/7th are talking long distance.

Donald Kimberlin
President
Telecommunications
Network Architectures
Safety Harbor, Fla.

Carrier Watch

The **Massachusetts Institute of Technology** last week awarded **AT&T** two contracts — totaling $3.3 million over three years — for the carrier's Software-Defined Network and Megacom WATS services.

MIT's interstate calls were formerly carried by **MCI Communications Corp.**, while its intrastate calls were handled by **New England Telephone Co.**, according to a spokesman.

The average cost of business telecommunications service dropped by 1% in the second quarter of 1989, the largest decline since the first quarter of 1987, according to **CCMI/McGraw-Hill.**

The decline indicates a return to the trend of falling telecommunications service prices.

George David, president of CCMI/McGraw-Hill, cited significant declines in the highly competitive switched services, including WATS and toll services.

Declines in access costs were the prime cause of the lower switched service rates, along with fierce competition between the major carriers, he said.

CCMI/McGraw-Hill, which provides rate, tariff and analytical information to telecommunications industry vendors and users, is a division of McGraw-Hill Information Services Co. ◼

NAW and US Sprint sign discount deal

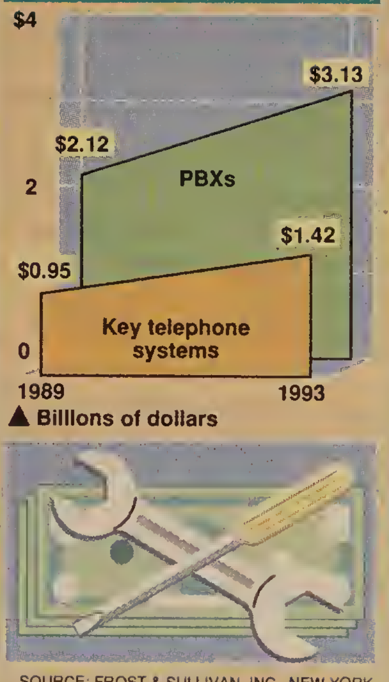
By Bob Wallace
Senior Editor

WASHINGTON, D.C. — The National Association of Wholesalers-Distributors (NAW) last week signed a contract with US Sprint Communications Co. that gives NAW members special discounts on three of the carrier's voice services.

NAW, which is based here and represents 45,000 wholesale-distribution companies with more than 150,000 business locations, is one of more than 85 groups to endorse US Sprint under the carrier's Association Member Benefit Program, according to a spokesman from US Sprint.

Created in early 1988, the program is designed to reduce US Sprint's marketing costs by providing specially discounted services to trade groups, which in turn promote them to their members. "We do everything we can to improve the profitability of our membership," an NAW spokesman said. "That includes negotiating favorable terms for products and services through group purchasing arrangements."

Spending on maintenance climbs



SOURCE: FROST & SULLIVAN, INC., NEW YORK
GRAPHIC BY SUSAN J. CHAMPENY

NAW will promote the US Sprint group purchasing contract through a direct mail campaign and through notices in NAW newsletters, the spokesman said.

Under the NAW/US Sprint contract, NAW members will receive a 5% discount on Dial 1 WATS calls made during the business day and a 10% discount on out-of-state Dial 1 and FONCARD calls made between 8 a.m. and 5 p.m. They will also get a 4% discount on calls made between 5

(continued on page 14)

WASHINGTON UPDATE

BY ANITA TAFF

It's in the basket. The Federal Communications Commission last week allowed AT&T to proceed with a 20% rate cut for its 56K bit/sec Dataphone Digital Service. AT&T had proposed the reduction in late June, but US Sprint Communications Co. objected to the revision, claiming AT&T had improperly classified the service and hence placed it in the wrong pricing category under price cap regulation.

Under price caps, limits on price changes are imposed on individual services and the pricing categories, or baskets, into which they fall. If Dataphone Digital Service were placed in the private-line basket, where US Sprint claims it belongs, the 20% reduction would violate the pricing floor for that basket. AT&T placed the service in the voice-grade and below basket. The FCC, however, sided with AT&T about the service. It said it found nothing patently unlawful about the revision.

Ups and downs. In the first six months of 1989, the major local exchange carriers asked for $56.4 million in new rate increases. During the same period, state regulators ordered $278.9 million in rate decreases from previous rate cases. These figures, which reflect rate requests from the seven regional Bell holding companies, GTE Telephone Operations, United Telecommunications, Inc. and Contel Corp., are compiled and released quarterly by the Federal Communications Commission's Industry Analysis Division.

Here's to your health. The Health Care Financing Administration, an arm of the U.S. Department of Health and Human Services, recently issued a request for proposal for a net

(continued on page 15)

Firm gets patent for LAN supporting voice

First Pacific's PX uses architecture to distribute switching to net stations, cuts need for central unit.

By Gail Runnoe
Washington Correspondent

SUNNYVALE, Calif. — First Pacific Networks, Inc. recently received a patent for a communications architecture that supports voice, data and video on a single broadband local network.

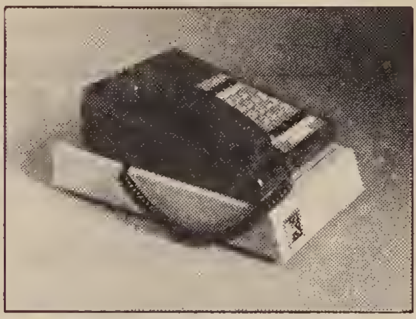
The technology, embodied in First Pacific's Personal Xchange (PX), distributes voice switching capabilities to every station on the network, eliminating the need for a central switching unit. The PX can either be used to replace small private branch exchanges or to augment larger existing switches.

Switched voice, low-speed data and video transmissions are supported on separate channels within the broadband backbone. Equipment can be connected directly to the cable or linked through discrete local networks.

Telephones are linked to the cable using desktop interface units that fit beneath a user's telephone. One voice interface unit is required for each telephone.

When a call is placed, the interface looks for an available channel by querying voice channels on the broadband cable, said Sherry Geddes, vice-president of marketing at First Pacific. The interface grabs a channel almost instantaneously, giving the user a dial tone and reserving a pathway for the transmission until the telephone receiver is replaced.

The broadband cable has 50 channels, which are usually divided into four voice channels capable of supporting up to 500 telephone extensions, 30 data channels and 16 two-way video channels.



Personal Xchange voice interface

Voice interface units can support any standard analog telephone set, and they provide an auxiliary port for connecting data and video equipment.

Geddes said that because all switching functions reside in these desktop units, whenever a

(continued on page 15)

Dedicated ISDN Centrex use may up service prices

By Bob Wallace
Senior Editor

The use of Integrated Services Digital Network Centrex services to support dedicated, high-speed data communications links might strain local telephone company central office switches designed to support dial-up voice traffic, vendors admit.

To accommodate the burden, the regional Bell holding companies may have to upgrade central office switch facilities, an expense the companies would add into ISDN Centrex service prices.

The ISDN Centrex 2B+D Basic Rate Interface specifies how a single telephone line can support two 64K bit/sec channels for voice and data communications and one 16K bit/sec D channel for signaling information and packetized data.

Although Centrex customers can use the B channels on a dial-up basis whenever they need them, some users also want to "nail up" some B channels to establish permanent Centrex links between devices for bandwidth-greedy applications such as bulk file transfers and local network bridging.

At least one RBHC, Southwestern Bell Corp., said it will have to reengineer and add capacity to some of its current network switches if many customers decide to dedicate B channels to data communications.

"The central office switches are designed to support an average call length of three to five minutes," said Rick King, area manager for customer applications analysis at Southwestern Bell. "Nailed-up B channels will eat up switch fabric for much longer periods of time."

Mark Christian, area manager of business product management for Southwestern Bell's special accounts, said hardware and software will be added to switches to

(continued on page 15)

Paper distribution company uses ACDs to gain a competitive edge

By Bob Wallace
Senior Editor

ST. LOUIS — Use of automatic call distributors (ACD) has enabled Great Northern Nekoosa Corp.'s Butler Paper Division to improve the efficiency of its nationwide customer service operations.

Each of the paper distribution firm's 100 offices is equipped with a Northern Telecom, Inc. Meridian SL-1 private branch exchange, which is used to serve as many as four customer service representatives.

Before the company installed ACDs, switchboard operators answered each call and passed it to a Butler Paper order taker. If the order taker was on the phone or away from his desk or if the telephone was forwarded to another station, the call was usually passed around the department, a practice that annoyed customers.

"We used to have a massive amount of complaints from callers who said their calls were transferred to customer service and rang forever," said Harvey Morgan-Weisberg, a communications analyst for Great Northern.

> "We're not a perfect operation," Morgan-Weisberg said. "But there's been a tremendous improvement."
>
> ▲▲▲

The company took steps to remedy the problem in January 1989, when it installed ACD software on its SL-1 here and at several of the other 100 Butler Paper offices. The ACD software is already in use at this first group of offices and may be installed at other locations in the next few years.

Butler Paper operators at locations with ACDs now answer all incoming calls and pass order calls to the ACD, which distributes them to customer service representatives. Although the ACDs let the offices handle more calls faster, problems arose as to how calls should be handled.

Many customers wanted to continue dealing with their customary service representative, while others did not have a preference. This posed a problem because ACDs distribute calls to agents on an as-available basis. "The challenge [was] to find a way to handle both types of calls simultaneously," Morgan-Weisberg said.

The firm employed an ACD feature as a partial fix for the problem. When a caller asked for a specific customer service representative, the operator used a special key on the attendant console to signal agents on another call. After hearing a buzz, agents could either speed through the current call to get to the next one or ignore the second call.

Although the feature did not fully address the problem, the firm was able to connect more customers to the agent of their choice while using the ACD to distribute other calls. "We haven't found a good solution to this problem, but we're still looking," Morgan-Weisberg said.

"We're not a perfect operation. We have some problems," he said. "But there's been a tremendous improvement over the old way [of doing business]."

When all agents are busy, callers are placed in a queue, but they do not have to wait on the phone long, Morgan-Weisberg said. "We couldn't tolerate typical airline environments, where callers are placed in a queue for several minutes until a reservations agent becomes available," he said.

"In our business, customers want the phone answered quickly when they call," he explained.

With that in mind, the firm pressed the ACD's Timed Overflow feature into action. The capability enables the company to set a maximum time a call can wait in queue before overflowing to the ACD supervisor's attendant console.

Now calls unanswered after 30 seconds are passed to the supervisor, and a light is illuminated on the supervisor's console.

The supervisor answers the call and then tries to locate a person to open up

NAW and US Sprint sign discount deal

continued from page 13

p.m. and 11 p.m., and a 3% discount on calls made after 11 p.m. and on weekends.

US Sprint would not divulge the length or estimate the value of the NAW contract.

NAW President Dirk Van Dongen hailed the agreement. "The cost savings our members will receive under the [program] will flow right through to the bottom line," he said.

Van Dongen predicted long-distance services will play a bigger role in NAW members' day-to-day business operations. "Wholesaler-distributors are consolidating operations, serving larger geographic areas and developing over-the-phone order-entry and inventory management systems that will result in even greater reliance on long-distance calling," he said.

Other associations participating in US Sprint's Association Member Benefit Program include the Aircraft Owners and Pilots Association, the American Consulting Engineers Council, the National Newspaper Association and the National Association of Broadcasters. ☒

Codex forges a direct link to NetView
By Paul Desmond
Staff Writer
Volume 6, Number 19
The Newsweekly o
Codex Unveils Dual Mo
By Matt Kramer
Codex Corp. last week introduced new firmware that permits its 2600 Series leased-line modems to be managed concurrently by IBM's NetView and Codex's management system.
Week®
Fairchild Business Newspaper • Monday, May 15, 1989
IBM MAY RE
Cod
IBM'
By JEANNE IID

Just a few of Dual

THE BEST MODEM FOR NETVIEW ISN'T FROM IBM.

When we announced the new DualView Management Option for 2600 Series modems, it made big news.

And the biggest news is, for the first time you can choose a modem for NetView based on capability instead of compatibility.

So if you need a leased-line modem for NetView at speeds up to 19.2 kbps, now you can get it with DualView. Along with an integral time division multiplexer, fully automatic dial back-up, and other exclusive features.

DUALVIEW MAKES NETVIEW WORK BETTER.

DualView expands NetView's modem management capabilities with 10 unique built-in features unavailable on IBM modems.

Plus DualView totally bypasses NetView/PC, so you can monitor your modem network directly from NetView.

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and man an ACD position.

This practice may eventually be eliminated when the firm equips its ACDs with Northern Telecom's Meridian Mail voice-messaging system in coming months. The system will give the ACD supervisor the option of directing unanswered calls to voice mail or back to the queue.

When incoming calls subside, agents will be able to use data left in the voice messages for callbacks. "Nonetheless, we will not force callers into voice mail until the technology becomes more widely accepted," he said.

The firm is also considering replacing some operators with automated attendants, devices that serve as front ends to a PBX and are designed to instruct callers to punch in digits to forward themselves to various departments. ◼

Dedicated ISDN use may up service prices

continued from page 13

handle nailed-up B channels.

The company has not yet filed a general tariff for ISDN Basic Rate Interface service, but it has sold ISDN Centrex to about 10 customers, including Tenneco, Inc. and Shell Oil Co., through custom network contracts. The cost of any equipment, software or engineering done to support a specific customer is passed on to that user in custom contracts, Christian said.

"If we had a piece of [a switch] that could, for example, handle 512 lines, we may equip it to handle only 350 lines because of the longer holding times and throughput needed for data communications at 64K bit/sec," he said.

"If we underengineered this, the customer would experience blockage and would not be able to make connections when they needed them," Christian added.

The RBHCs rely on central office switch firms and Bell Communications Research, Inc. to provide guidelines to help in the engineering process.

"They predict how much switch traffic we will have for ISDN applications," Christian said. The central office switches generate traffic reports that tell the RBHCs how much traffic each [ISDN] customer is running through the switch, he added.

Traffic predictions based on the engineering guidelines have generally been on the nose. "It was a learning experience with the first few ISDN customers," Christian said. "But we're getting better at [anticipating ISDN traffic] as we go along." ◼

Firm gets patent for LAN supporting voice

continued from page 13

telephone extension must be moved, the phone set and the voice interface unit can simply be plugged in to the cable at the new location. No rewiring or reprogramming is required.

Connections to the outside world are supported through trunk interface units, each of which supports as many as 72 trunks. A single network can support multiple trunk interfaces.

The PX can support data at 10M bit/sec, as well as broadband and baseband networks. While broadband networks can connect directly into the PX, baseband networks must connect through a modulator. The PX is Open Systems Interconnection-compatible, and it supports most standard protocols, Geddes said.

The PX can also carry full-motion video signals on 6-MHz channels, and can support cameras, video cassette recorders, video monitors and other video devices.

The maximum number of voice, video and data devices that can be interfaced to the PX depends on the user's traffic characteristics. "Effectively, several thousand devices can be interfaced," Geddes said. The PX cable can extend a distance of eight miles without repeaters.

First Pacific is targeting the PX at government, commercial and institutional users. Regional Bell holding companies may also be interested in reselling the system in markets where they now sell PBXs, said Maxwell Steinhardt, First Pacific's vice-president of sales and service.

Fiber optics in future

While the first PX product releases, which are due out early next year, will use broadband cable and single-line voice interface units, later PX releases will include fiber-optic cable and an eight-line voice interface unit. First Pacific will also release a feature phone with an internal voice interface unit.

Ian Angus, president of Angus TeleManagement Group, Inc. in Toronto, said First Pacific may not find a very large market for its broadband products.

"They may have a technology in search of applications and users," Angus said. He added that First Pacific will have to prove to users that its product gives some type of increased functionality.

Geddes said the price for the PX system will range from $1,000 to $1,500 per line, depending on configuration. ◼

Washington Update

continued from page 13

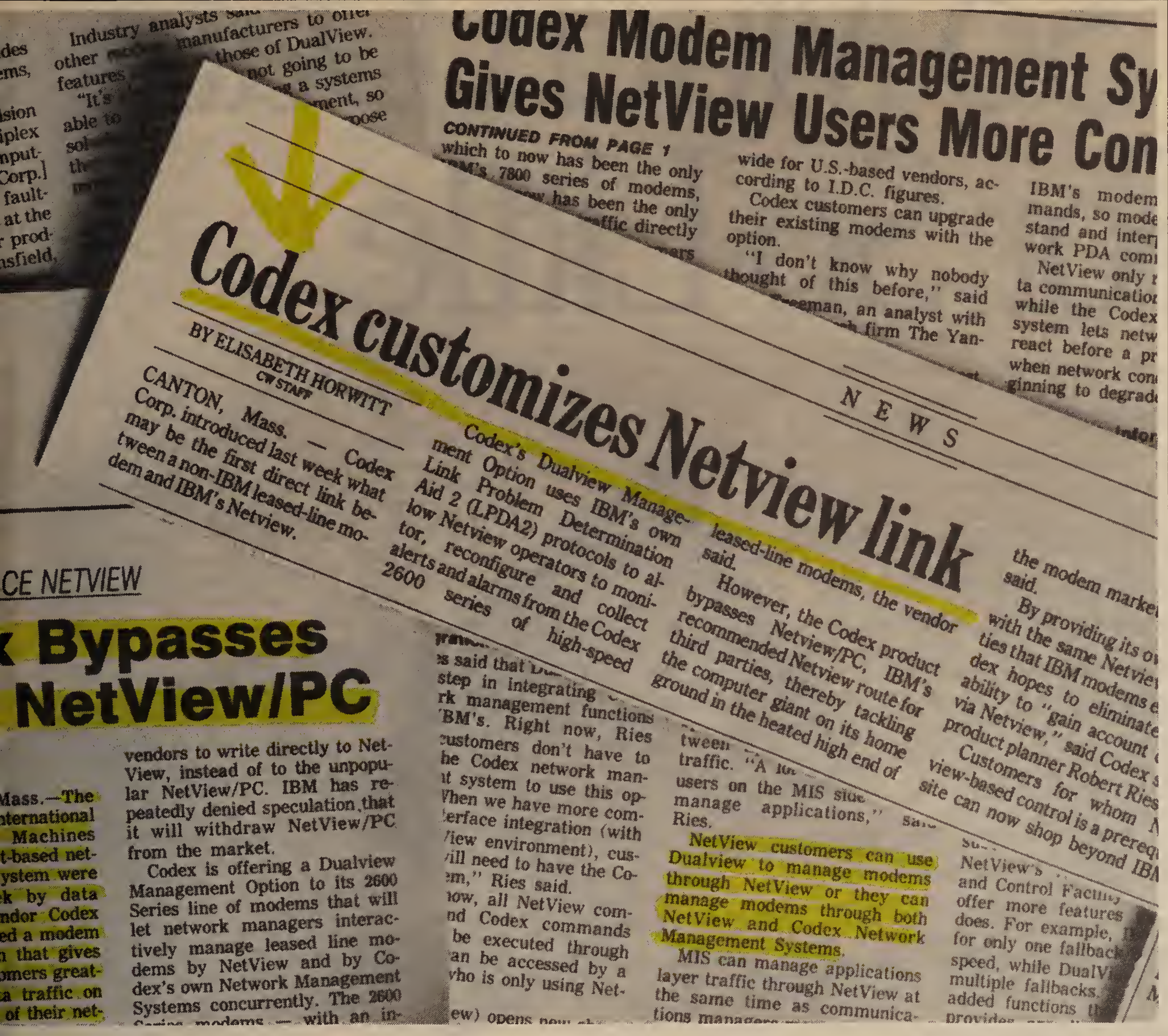
that will connect 60,000 pharmacies nationwide.

The network, which will support an on-line prescription billing system, is part of a $2 billion program approved last year by Congress to improve health care for the elderly.

It will be comprised of personal computers or point-of-sale terminals located in all pharmacies participating in the Medicare program and will enable pharmacists to determine the status of a customer's benefits and the amount to be paid on deductibles.

The contract will be divided among three vendors. Those three vendors will each develop a regional processing center for the system.

The new pharmacy net is expected to become operational Jan. 1, 1991. ◼



Codex Modem Management Sy
Gives NetView Users More Con

CONTINUED FROM PAGE 1

which to now has been the only IBM's 7800 series of modems, has been the only traffic directly

wide for U.S.-based vendors, according to I.D.C. figures.

Codex customers can upgrade their existing modems with the option.

"I don't know why nobody thought of this before," said Freeman, an analyst with research firm The Yan-

IBM's modem commands, so modems stand and interpret network PDA commands. NetView only ta communication while the Codex system lets network react before a problem when network conditions beginning to degrade

NEWS

Codex customizes Netview link

BY ELISABETH HORWITT
CW STAFF

CANTON, Mass. — Codex Corp. introduced last week what may be the first direct link between a non-IBM leased-line modem and IBM's Netview.

Codex's Dualview Management Option uses IBM's own Link Problem Determination Aid 2 (LPDA2) protocols to allow Netview operators to monitor, reconfigure and collect alerts and alarms from the Codex 2600 series of high-speed leased-line modems, the vendor said.

However, the Codex product bypasses Netview/PC, IBM's recommended Netview route for third parties, thereby tackling the computer giant on its home ground in the heated high end of the modem market, said.

By providing its own with the same Netview ties that IBM modems dex hopes to eliminate ability to "gain account via Netview," said Codex product planner Robert Ries. Customers for whom Netview-based control is a prerequisite can now shop beyond IBM

CE NETVIEW

x Bypasses NetView/PC

vendors to write directly to NetView, instead of to the unpopular NetView/PC. IBM has repeatedly denied speculation that it will withdraw NetView/PC from the market.

Codex is offering a Dualview Management Option to its 2600 Series line of modems that will let network managers interactively manage leased line modems by NetView and by Codex's own Network Management Systems concurrently. The 2600

NetView customers can use Dualview to manage modems through NetView or they can manage modems through both NetView and Codex Network Management Systems.

MIS can manage applications layer traffic through NetView at the same time as communica-

View's rave reviews.

AND EVERYTHING WORKS BEST WITH A CODEX 9800 NETWORK MANAGEMENT SYSTEM.

DualView does more than let your modems talk directly with NetView. It lets you talk simultaneously to a Codex Integrated Network Management System that does a lot of things NetView can't, like predict problems and help solve them, instead of just reacting to them.

What this all adds up to is the best of everything for you: NetView to manage your SNA environment, and Codex to manage your data communications network.

CALL US FOR A DUALVIEW PREVIEW.

We invite you to give DualView your own review. For more information about how DualView can make NetView more efficient and productive, just call us toll free at 1-800-426-1212 Ext. 7235.

And find out what everybody's been raving about.

codex
MOTOROLA

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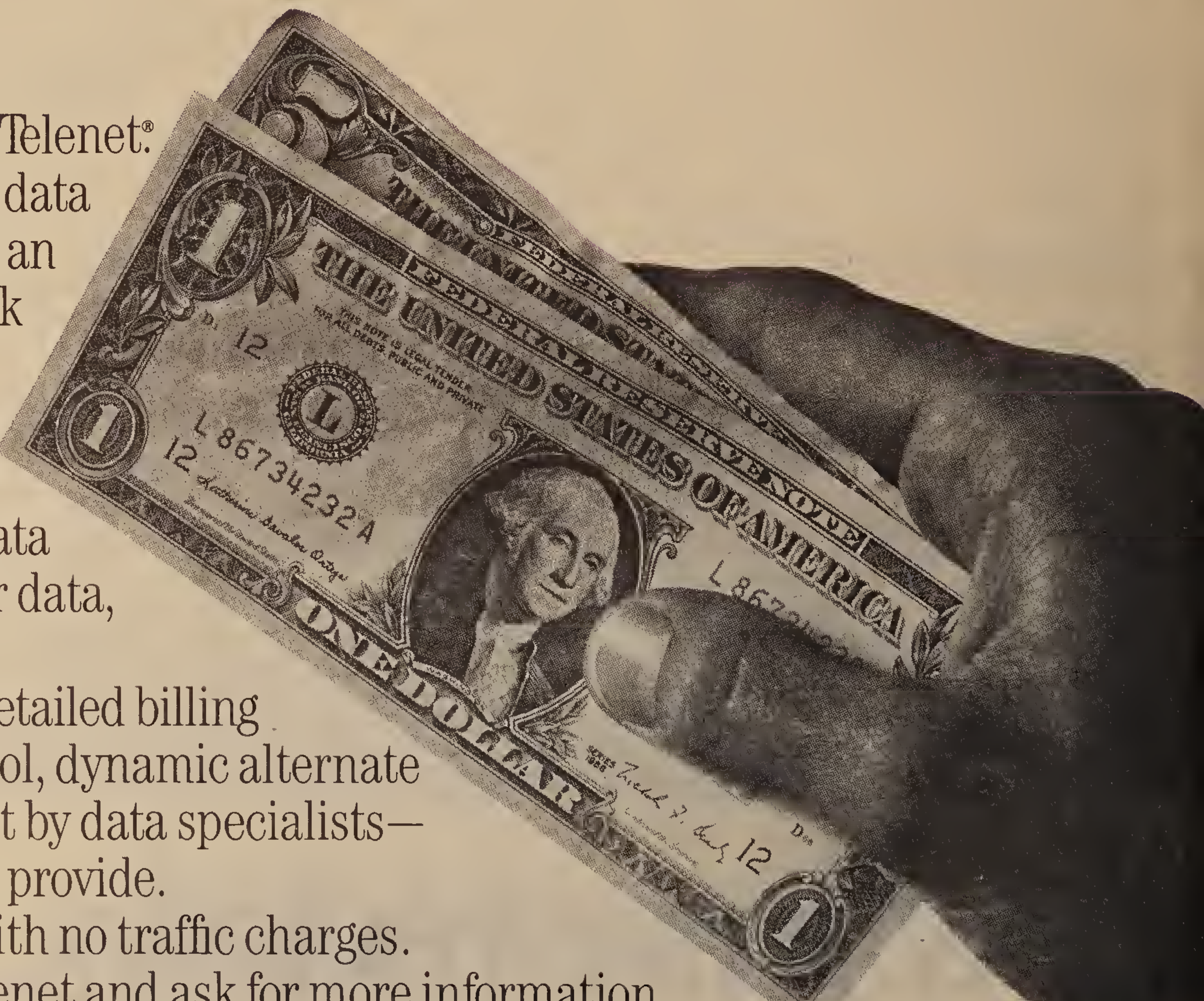
Never Before Have So Many Sent So Much Data For So Little.



Introducing DataCall Plus℠ from Telenet.® A new service that lets you send data anywhere in America for as little as $6 an hour—over a fiber optic based network that's a million times more accurate than ordinary WATS or DDD services.

Along with this incredible low price, DataCall Plus sends your data via a network designed specifically for data, Telenet's Public Data Network.

So you get special features like detailed billing reports by user, end-user access control, dynamic alternate routing and 24-hour customer support by data specialists—features no WATS or DDD service can provide.

All for as little as $6 an hour—with no traffic charges.

If you have data to send, call Telenet and ask for more information on DataCall Plus today.

After all, there's never been a data service this good for a price this low.

Call **1-800-TELENET** today.

Telenet
A US Sprint Company

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Worth Noting

"DEC couldn't draw a hierarchy if it tried."

James Herman
Principal
Northeast Consulting
Resources, Inc.
Cambridge, Mass.

Data Packets

SHARE, Inc., the IBM users group, is hosting a six-day conference Aug. 20 to 25 in Orlando, Fla. The conference will offer about 1,000 technical sessions and several keynote speeches on a range of topics, including IBM's Systems Application Architecture, automated operations and Open Systems Interconnection.

The conference will also include a one-day session for chief information officers of SHARE member companies. The session will focus on preparing U.S. businesses to manage information processing into the 21st century.

For more information, contact SHARE at 111 E. Wacker Drive, Suite 600, Chicago, Ill. 60601, or call (312) 644-6610.

Crosstalk Communications, a division of Digital Communications Associates, Inc., recently said it began shipments of its Crosstalk for Windows communications package, which works with IBM Personal Computers running Microsoft Corp.'s Microsoft Windows.

Crosstalk for Windows supports Microsoft's Dynamic Data Exchange (DDE) protocol, which is a standardized method for passing data between applications that are currently executing under Microsoft Windows.

With the DDE support, users can program a spreadsheet running under Microsoft Windows to transparently instruct Crosstalk for Windows to automatically invoke communications routines needed to access a public data base service provider and download the necessary data.

Crosstalk for Windows costs $195. ◪

MFS makes foray into data services

Alternative carrier attracts customers with voice services and then sells them its data offerings.

By Jim Brown
Senior Editor

OAKBROOK TERRACE, Ill. — Although primarily known as a low-cost voice service alternative to local Bell operating companies, Metropolitan Fiber Systems, Inc. (MFS) has been increasing its focus on digital data services.

MFS, which has plans to install fiber-optic networks in the business sectors of 20 major cities by the end of 1990, woos customers with its voice services and then tries to convert them to its data offerings, which the company claims cost 15% less than comparable BOC services.

MFS' services are used to link user locations within a city or tie a customer site directly to a long-haul carrier's point of presence ("Alternative carriers gaining user favor," *NW*, July 17).

On the data side, MFS offers leased-line services supporting speeds ranging from 2,400 bit/sec to 1.544M bit/sec T-1 and 45M bit/sec T-3 offerings (see "MFS services span the range of offerings," page 18).

The company is also developing a fractional T-1 service that will eliminate the typical BOC requirement to use a full T-1 pipe to access long-haul carriers' fractional T-1 services.

"Typically, we penetrate an account on the voice side," said George Tronsrue III, MFS vice-president for corporate planning and information management. "After they become comfortable with the quality and service we provide, they begin sending their data to our network."

Three-step strategy

MFS uses three major selling points to win accounts away from BOCs, Tronsrue said. It ensures reliability by providing redundant fiber routes; it responds faster to user requests than the BOCs; and it offers low-priced services.

The company's fiber networks have sprung up in Baltimore, Boston, Chicago, Minneapolis and Philadelphia over the last two years. Networks are under construction in Houston, Los Angeles and San Francisco, and plans call for other nets in Dallas, New York and Washington, D.C. The company is currently deciding which other cities it will serve.

MFS is owned by Kiewit Communications Co., Inc., a subsidiary of Peter Kiewit Sons, Inc. Peter Kiewit Sons is a privately held company with annual revenue of $6 billion.

"Kiewit has committed in excess of $75 million for MFS expansion," Tronsrue said. MFS, he

(continued on page 18)

DATA DIALOGUE

BY JOE MOHEN

Solving the puzzle of independent LU support

Last of a series about independent logical units.

Curiosity has permeated my work with the independent logical units defined within IBM's Systems Network Architecture. There are some fine points I don't understand, and that irritates me to no end.

One such point is why some PU 2.1 nodes support independent logical units and some do not.

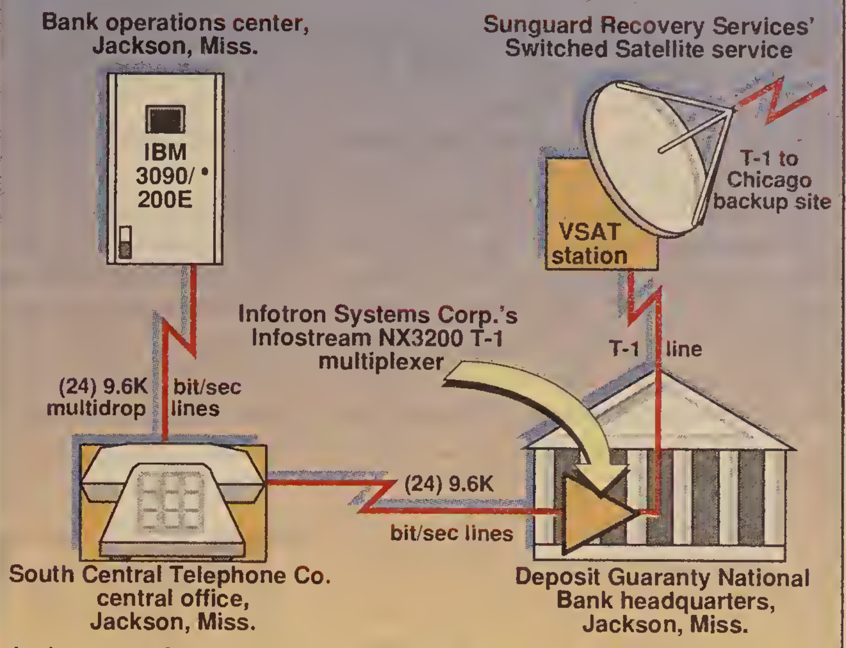
The System/38, for example, never used to support independent logical units, even though it supported LU 6.2 and PU 2.1. Now it does. What exactly did IBM change to add the support?

I asked several IBM specialists about this and got two different answers. The first IBMer, an SNA architect, told me IBM had to put an extra field into the Exchange Identification (XID) message that System/38s and other PU 2.1 devices send to nodes during a communications session. This extra field, called the CP Name Vector, names the transmitting node's

(continued on page 18)

Mohen is a Systems Network Architecture specialist and consultant based in New York.

Covering all the bases


Bank operations center, Jackson, Miss.
IBM 3090/200E
Sunguard Recovery Services' Switched Satellite service
T-1 to Chicago backup site
VSAT station
Infotron Systems Corp.'s Infostream NX3200 T-1 multiplexer
T-1 line
(24) 9.6K multidrop bit/sec lines
(24) 9.6K bit/sec lines
South Central Telephone Co. central office, Jackson, Miss.
Deposit Guaranty National Bank headquarters, Jackson, Miss.

In the event of an outage at its data operations center, Deposit Guaranty National Bank can switch the bank's traffic to a satellite-based T-1 service that uploads data to a Chicago hot backup site.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: DEPOSIT GUARANTY NATIONAL BANK, JACKSON, MISS.

Bank picks satellite-based T-1 for disaster recovery

Dumps 56K bit/sec dial-up links it used in past.

By Paul Desmond
Senior Writer

JACKSON, Miss. — Deposit Guaranty National Bank has scrapped four 56K bit/sec dial-up links it once used for disaster recovery in favor of a less expensive on-demand, satellite-based T-1 service that provides more bandwidth.

In the event of a disaster at Deposit Guaranty's data center here, the bank can switch the data communications lines used to support branches to a SunGard Recovery Services data center in Chicago. Federal regulations require interstate banks to have disaster recovery plans.

As the number of 9.6K bit/sec multidrop lines requiring backup increased from 16 to 24, the bank opted for SunGard's very small aperture terminal-based Switched Satellite Service, which was 27% less expensive than using 56K bit/sec dial-up links, according to Jimmy Pittman, vice-president of technical support for the bank.

Now Deposit Guaranty has backup bandwidth to spare. "Now that we have the satellite installed, there are other capabilities we want to look at getting into," Pittman said. Those include satellite-based video training courses and bringing the bank's automated teller network into the disaster recovery plan.

Deposit Guaranty has 129 branch offices throughout Mississippi, all supported by 9.6K bit/sec multidrop lines supplied by South Central Bell Telephone Co. The net is anchored by the bank's IBM 3090/200E mainframe.

In the event of a disaster, the company uses South Central's FlexServe Service to reroute the multidrop lines to Deposit Guaranty headquarters in downtown Jackson. With FlexServe, a user can reconfigure lines by remotely accessing the computer that controls the carrier's digital access and cross-connect system, Pittman said. At its headquarters, the bank routes the 9.6K bit/sec lines to an Infotron Systems Corp. Infostream NX3200 T-1 multiplexer, which multiplexes the signals into a T-1 data stream that is fed to a VSAT earth station.

The VSAT lets the bank access GTE Spacenet Corp.'s Certain-T-1 service, an on-demand T-1 offering that bounces the data down to SunGard's Chicago data center.

In Chicago, the satellite link is terminated in a larger Infotron NX4600 multiplexer that has a built-in matrix switch, said Ray Rudnitskas, director of network systems engineering for SunGard. The 4600 is linked to SunGard's IBM 3725 front-end processor.

The matrix switch lets Deposit Guaranty network operators use terminals in Jackson to configure the cross-connection of input ports to the appropriate output ports on the 3725.

Pittman said that feature enables him to send only two operators and two technicians to the Chicago hot site to load backup data tapes while the rest of his net management staff moves to the company headquarters to run the network from spare terminals there. That saves both transportation costs and time.

"Once we get to Chicago," he said, "we can have the system up in about six hours." ◪

Solving the puzzle of LU support

continued from page 17

control point. The new systems, such as the Application System/400 and OS/2 Extended Edition, all send it when first contacting a host.

But as it turns out, some older nodes that work with independent logical units do not send the control point name field when they first make contact (for example, the Advanced Program-to-Program Communications/Personal Computer).

I then posed the question to an IBM systems engineer on Long Island. He told me that to get PU 2.1 nodes such as System/38s to work with independent logical units, you have to be able to set a single bit in the PU 2.1's XID that says, "Suppress activation of the node," or "Do not send an Activate Physical Unit."

The IBMer explained this was because independent logical units do not need to establish sessions between the physical unit and VTAM. That is, they do not have system service control point (SSCP)-to-physical unit sessions. This seems so simple. The older PU 2.1 nodes would only have to change one bit!

However, it seems that independent logical units can, but do not have to, have a session between the local node and VTAM. Independent logical units establish those SSCP sessions in order to send net management alarm data from a logical unit to a VTAM host running NetView.

When you look at it this way, the peer node that supports independent logical units is kind of a hybrid slave node. It reminds me of what we thought of as a peer in the early 1980s, when nodes were still dependent on the host. A trace still lingers of the subservient relationship with the host for the sake of network management.

My best guess as to why some PU 2.1 nodes support independent logical units and some don't is that some physical units have extra bits in their transmission header, which is tagged on the front of a data stream destined for the independent logical unit. Only IBM, however, can answer this riddle. And IBM should. It owes it to users because by learning and working with independent logical units, users can gain a whole new set of functionality they couldn't get before. But unless IBM steps forward and sheds some light, it's going to make it difficult for users to work with independent logical units. ◪

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MFS services span the range of offerings

Metropolitan Fiber Systems, Inc. (MFS) offers a mix of voice and data services in the business sectors of major cities that customers can use to link local sites or access a long-haul carrier.

The services include:

- Voice Link Plus, a replacement for analog four-wire leased lines used to support data at up to 9.6K bit/sec. MFS takes analog feeds from users, digitizes it and delivers the data to either another location on the network or a long-haul carrier's point of presence (POP).
- MetroExpress I, a T-1 service used to link a customer's T-1 equipment to a long-haul carrier's T-1 services.
- MetroExpress II, a T-2 service used to combine four T-1 data streams from a customer's T-1 multiplexer into a single 6.312M bit/sec circuit running to another location on the network.
- MetroExpress III, a 45M bit/sec T-3 service that provides the capacity of 28 individual T-1s between customer-provided T-3 multiplexers.
- MetroCarrier Express, a T-1 service connecting customer sites to a long-haul carrier's POP. This includes MFS T-1 multiplexing equipment.
- MetroHub I, in which MFS will combine circuits from multiple sites onto a single T-1 destined for a long-haul carrier's POP or a high-volume end-user location in the same city.
- MetroHub III, which combines T-1 lines from multiple sites onto a T-3 circuit destined for an interexchange carrier's POP or a user site on the MFS net.

MFS' lone data-only service is MetroData, a digital data service (DDS) that supports access to long-distance DDS type services at speeds up to 56K bit/sec.

— *Jim Brown*

MFS makes foray into data services

continued from page 17

said, invests at least $5 million in the networks it builds in each city.

So far, only the Chicago network has been producing enough revenue to break even and is expected to turn a profit in the next three months, Tronsrue said. The other networks are so new, he said, that even though they have customers, it is difficult to speculate when they will break even or turn a profit.

To decide where it will build a network, MFS examines the BOCs' published leased-line revenue reports, Tronsrue said. "We then select the buildings in the downtown business district that have the highest concentration of users that need the type of service we can provide," he explained.

The company runs fiber cable to the selected buildings through existing or new underground conduits or other structures such as subway tunnels.

MFS leases space in each of the buildings on the network to house its equipment and pays building owners for the right to install its own twisted-pair wire or coaxial cable to the floors on which MFS customers are located. ◪

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

> "Sixteen megabit per second token-ring is a technology that is well in advance of demand. Users won't install 16M bit/sec token-ring nets for at least six months."
>
> **Mary Modahl**
> Analyst
> Forrester Research, Inc.
> Cambridge, Mass.

Netnotes

Concord Communications, Inc. has announced the MAPware Series 1210, a communications interface that links IBM Personal Computers on networks running Manufacturing Automation Protocol software.

The Series 1210 consists of a controller and modem that implement the seven-layer MAP 3.0 profile and conform to Open Systems Interconnection standards.

As part of the announcement, Concord introduced the OSI Programmers Package (OPP), which provides high-level interfaces to the Series 1210 communications services for programming applications.

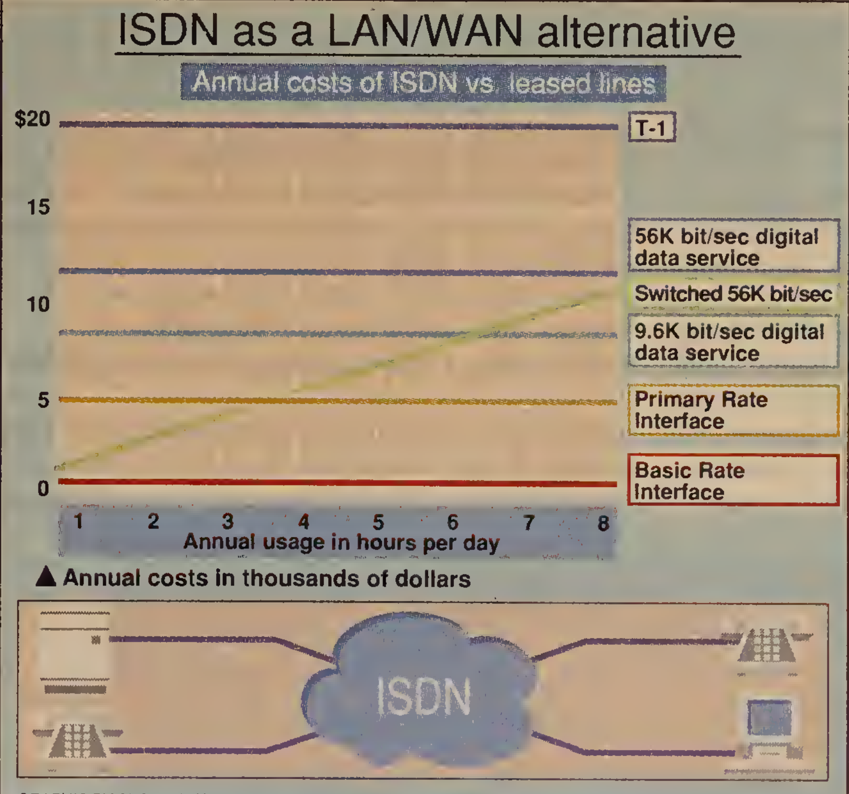
OPP, which is available for either MS-DOS or OS/2 systems, contains a tool box of utilities, including installation, configuration, management, communications and directory tools.

The Series 1210 is priced at $2,295 with an internal broadband modem or $1,895 with an internal carrierband modem. A MAP 3.0 starter kit that allows a user to install a full MAP network is priced at $18,800 for broadband and $10,900 for carrierband.

The starter kit includes three nodes, head-end remodulator (broadband version only), cabling, Manufacturing Message Specification (MMS) software and training.

Concord may be reached at 753 Forest St., Marlborough, Mass. 01752, or call (508) 460-4646.

(continued on page 20)



GRAPHIC BY SUSAN J. CHAMPENY SOURCE: TELEOS COMMUNICATIONS, INC., EATONTOWN, N.J.

ISDN looms as way to link remote LANs

Interfaces for servers, routers and bridges will set ISDN as high-speed transmission alternative.

By Laura DiDio
Senior Editor

FRAMINGHAM, Mass. — Although still far off, ISDN services will someday provide a cost-effective way to link geographically dispersed local nets, vendors and analysts predict.

Interfaces to Integrated Services Digital Networks will be available for local network servers, routers and bridges, and will provide users with a high-speed digital transmission alternative to dedicated lines, digital data services, X.25 packet nets and T-1 facilities.

"ISDN will allow users to connect their local nets together over very high-performance lines without the high cost of a dedicated leased line," according to Howard Fiderer, product manager at Teleos Communications, Inc. in Eatontown, N.J., a vendor of ISDN equipment.

ISDN services are all-digital and typically dial-up, meaning users can establish high-speed temporary connections between remote sites. The ISDN Primary Rate Interface supports 24 64K bit/sec channels, and the Basic Rate Interface supports two 64K bit/sec channels and another 16K bit/sec channel.

ISDN and E-mail

One obvious application for ISDN linking local networks is in the transmission of electronic mail, Fiderer said.

Users at corporate headquarters who want to send E-mail messages to remote branch offices or vice versa could simply establish an ISDN link for the duration of the message. Once the message was transmitted, the network could terminate the connection as though it were an ordinary phone call.

"It's a very simple mechanism; ISDN is essentially a high-performance data telephone call," Fiderer said.

There is little demand for local network interfaces to ISDN today because ISDN services are only available in a few locations. Consequently, the availability of local net ISDN adapters is at least a year to 18 months away, according to vendors and analysts.

Harvey Cohen, a senior consulting partner at BIS CAP International, a consulting firm in Norwell, Mass., said there are about 80,000 ISDN lines in use throughout the U.S. and that most of those are used for voice transmission.

> One obvious application for ISDN linking local nets is in the transmission of E-mail.

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"For the most part, users still aren't plugging their PCs into ISDN services, let alone plugging their LANs into ISDN," Cohen said.

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Broadcasters group dumps mini for versatile local net

NAB hopes to take advantage of applications.

By Sarah Vandershaf
West Coast Correspondent

WASHINGTON, D.C. — The National Association of Broadcasters (NAB) recently completed a migration from an aging minicomputer to a local network in order to take advantage of application software available for microcomputers.

Before migrating to the network, NAB supported its membership of 980 television stations and 5,200 radio stations, as well as its accounts payable system, on a Data General Corp. Eclipse C350 minicomputer with 30 D200 terminals.

But as NAB grew, users began calling for new applications and the minicomputer could not keep up with the number of terminals needed.

"The minicomputer was so old, we couldn't put any more [terminals] on the network," said Edgar Quiroz, NAB's data processing manager.

Faced with the need to upgrade, NAB opted for a local network, primarily to take advantage of the greater range of commercial software available for personal computers.

"There were so many beautiful applications already written in MS-DOS, thousands of packages, and we couldn't use any of them with the minicomputer," Quiroz said.

Down memory lane

Quiroz turned to Memory Systems, Inc., a Washington, D.C.-based computer network systems integrator, to supply the network equipment and to offer advice on how to set it up.

The network that Memory Systems devised was an IBM Token-Ring Network running Version 2.1 of Novell, Inc.'s NetWare net operating system. It supported

(continued on page 20)

DEC introduces more efficient terminal server

By Laura DiDio
Senior Editor

FRAMINGHAM, Mass. — Digital Equipment Corp. recently introduced a terminal server that offers twice the performance of the model it replaces. The company also announced an Ethernet repeater based on the IEEE 802.3 standard.

The DECserver 300, an Ethernet terminal server, supplants the DECserver 200 DL model and reduces the cost per connection by 30%, from $380 to $275, according to Gail Daniels, DEC's local net marketing manager. Users who commit to buying 10 or more DECserver 300s are also eligible for volume discounts that can drop that cost to $230.

The new server supports as many as 16 terminals and offers throughput of 33,000 characters per second, compared with the DECserver 200, which had eight ports and supported 12,000 characters per second, Daniels said.

Besides the lower cost and increased power, the DECserver 300 offers several other new features, including a Data Terminal Ready/Data Send Ready capability that provides enhanced session management and security. For example, when users log off, messages are sent to the host telling it to end the session, thus preventing unauthorized use.

The DECserver 300 is available now and costs $4,400. The earlier eight-port DECserver 200 DL sold for $3,040.

DEC also introduced the DECrepeater 200, a device that can be used to link standard baseband IEEE 802.3 Ethernet segments — which have a maximum length of 1,500 feet — to create networks that can span nearly a mile.

According to Daniels, the new repeater was built to comply and interoperate with IEEE 802.3 standard repeaters. DEC, however, will continue to sell its older DECrepeater, which is based on its own Ethernet protocols.

There are minor technical differences between the earlier Ethernet DECrepeater and the latest IEEE 802.3 DECrepeater 200, Daniels said. "The user wouldn't see any performance difference. We just wanted full interoperability with DECrepeater." Customers with DEC Ethernets, Daniels emphasized, can continue to use the existing DECrepeater.

The DECrepeater 200 features several enhancements over the older DECrepeater, including increased fault isolation.

The DECrepeater 200 is available now and costs $1,475 for standard Ethernet cabling. A fiber-optic version is also available for $2,750. ■

Broadcasters dump mini for local net

continued from page 19

140 workstations and an IBM Personal System/2 Model 80 configured as a gateway hub for seven departmental subnets.

The Arcnet subnetworks each have their own Personal System/2 Model 80 servers and support five to 20 personal computers.

Departmental nets

Each of the subnetworks serves a separate function, Quiroz said. The accounting department, for instance, runs a general ledger package, while the public affairs department uses WordPerfect Corp.'s WordPerfect and Aldus Corp.'s PageMaker for desktop publishing.

The other subnetworks are used to track sales from NAB's bookstore, ensure the association's mailing list represents different sectors of the broadcast industry and maintain data bases on such subjects as broadcast technology, FCC regulations and the economics of running a radio or TV station.

In addition to the gateway hub on the backbone, two other Personal System/2 Model 80 servers are situated directly on the backbone.

One has taken over the job of the minicomputer, supporting the membership and accounts receivable data bases, and the other is a dedicated communications server that supports modem-pooling and manages multiple sessions between devices.

The communications server runs Novell's NetWare Asynchronous Communications Software, which enables six regional managers to dial in to the server with their personal computers.

The server can also establish sessions to regional sites, enabling NAB headquarters to download information about membership rates.

Now that NAB has finally completed installation of the network, the trade association has several pet projects it hopes to use the local network to support.

One goal, Quiroz said, is to develop an expert system-based archival system that would enable a user to request data on a particular subject and have the expert system scan the network to locate the data, package it and route it to the inquiring user. ☐

ISDN looms as way to link remote LANs

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Skip Addison, director of product planning in Novell, Inc.'s Communications Products Division in Sunnyvale, Calif., said local net suppliers have shied away from ISDN products because users "can't go to Bell companies to buy ISDN services. A limited number of Bell operating companies do have Primary Rate Interfaces, but Basic Rate Interfaces are virtually nonexistent."

ISDN indifference

No local net vendors have announced ISDN products yet. Several vendors — including Novell, 3Com Corp. and Digital Equipment Corp. — said their efforts are still in the conceptual phase. 3Com, at this point, has not even gone public with a strategy to support the services.

"Long term, we're enthusiastic about the prospect of being able to link remote LANs using ISDN services, but short term, it's still a little too leading edge for today's local net applications," Addison said.

> No local net vendors have announced ISDN products yet. Several said their efforts are still in the conceptual phase.
>
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Bill Mitchell, marketing manager for wide-area network and DECnet products at DEC, said that while his company does not offer an ISDN interface product now, it does plan to provide ISDN wide-area net connections within a year. Mitchell said that DEC has already demonstrated a prototype ISDN Basic Rate Interface synchronous communications adapter board in its laboratories that would plug into a MicroVAX used as a router on a local net.

"The initial implementation will provide users with routing capability between remote nodes on a DECnet network and allow them to utilize ISDN services," Mitchell said.

But he cautioned, "DEC doesn't have anything to sell now, and we're at least a year away from market."

"No, it's not soup yet," Fiderer says. "But for what it can offer users, ISDN as a wide-area alternative is worth the wait." ☐

Netnotes

continued from page 19 .

Corvus Systems, Inc., currently reorganizing under Chapter 11 bankruptcy law, last week released ReadyNet, an entry-level networking system aimed at small businesses and departmental work groups.

ReadyNet will be sold in two configurations: the ReadyNet Start-Up Kit, with preconfigured software and hardware for a two-node network; and the ReadyNet Add-On Kit, containing software and hardware for adding another node to the network.

The start-up kit is priced at $499, and the add-on product costs $249.

Corvus Systems is located at 160 Great Oaks Blvd., San Jose, Calif. 95119, or call (408) 281-4100. ☐

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The same holds true in Colleen's job at Wang Financial. The decisions she makes in selecting a private-line vendor are absolutely critical. Especially when you consider that Wang Financial uses private lines to supply money managers, banks and brokers with real-time stock market information. At any given moment, vital information that translates into multimillion-dollar transactions is crossing the lines through Wang Financial's SHARK® service. And if there's an interruption in transmission . . . well, that's serious trouble.

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Worth Noting

"One of the industries we studied that was most dramatically altered by information technology was drug wholesaling. Electronic order entry is used by almost 100% of some wholesalers' customers."

From "When to Lead, When to Follow, And When to Go Your Own Way," a report
by Eric Clemons
University of Pennsylvania
Philadelphia

Association Watch

A new slate of previously elected officers have assumed their posts at the **Communications Managers Association (CMA).** The president is now Jerald Marcone. Marcone currently works as assistant vice-president of telecommunications at New York-based Crum & Forster Corp. CMA is a regional group of communications managers.

New to the 10-member board are Patrick Hennelly, manager of telecommunications operations for McGraw-Hill, Inc.; Dennis Finn, vice-president of facilities communications for The First Boston Corp.; Richard Dinan, manager of voice networks and telecommunications at the Bank of New York; and Lee Bewley, manager of telecommunications for GAF Corp.

The **Southeastern Telecommunications Association (SETA),** a Columbia, S.C.-based users group, is set to hold its 14th annual conference and exhibition, Aug. 28 to 30 in Nashville.

Among the speakers slated is Jay Parsons, communications manager for the Tennessee Valley Authority, who will speak on contract negotiations. For more information, contact SETA at (803) 731-5640. ◻

INTUG exec blasts European Commission telecom policy

Accuses EC of watering down future competition.

By Wayne Eckerson
Staff Writer

LONDON — An official of the International Telecommunications Users Group (INTUG) last week said policy directives issued recently by the European Commission compromise the goal of creating an open and competitive telecommunications marketplace in Europe.

INTUG Chairman George McKendrick said the European Commission has "watered down" initiatives laid out in the Green Paper, which was endorsed by the European Council of Ministers last year.

Some EC directives may undermine the gains users might reap from an open market.

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The Green Paper calls for European governments to loosen the regulations that currently restrict telecommunications competition in European countries.

INTUG is an international association that represents the interests of telecommunications users before a variety of international policy- and standards-making groups.

After approving the Green Paper initiatives last year, the Council of Ministers asked the European Commission to draw up policy directives based on those initiatives to be implemented by European governments.

More specifically, the commission was charged with defining the conditions by which third parties could provide value-added network services. It was also called upon to draw up a framework for allowing open access to the public network, an initiative known as the Open Network Provision (ONP).

But some of the 300 directives recently issued by the European Commission threaten to undermine the gains business users might reap from a more open European telecommunications marketplace.

Increased competition would force European Post, Telegraph and Telephone administrations to be more customer-driven and

(continued on page 22)

EXECUTIVE BRIEFS

BY WAYNE ECKERSON

Down home on the farm. It pays to stay close to home — corporate headquarters, that is.

According to a survey by Challenger, Gray & Christmas, a corporate outplacement service company in Chicago, executives who accept jobs at corporate headquarters, as opposed to remote field offices, improve their chances for job advancement by 20%.

Visibility with upper management is critical to job advancement, according to James Challenger, the company's founder. Senior management is more likely to get to know executives who work at headquarters than in field offices, and this often leads to more rapid promotions.

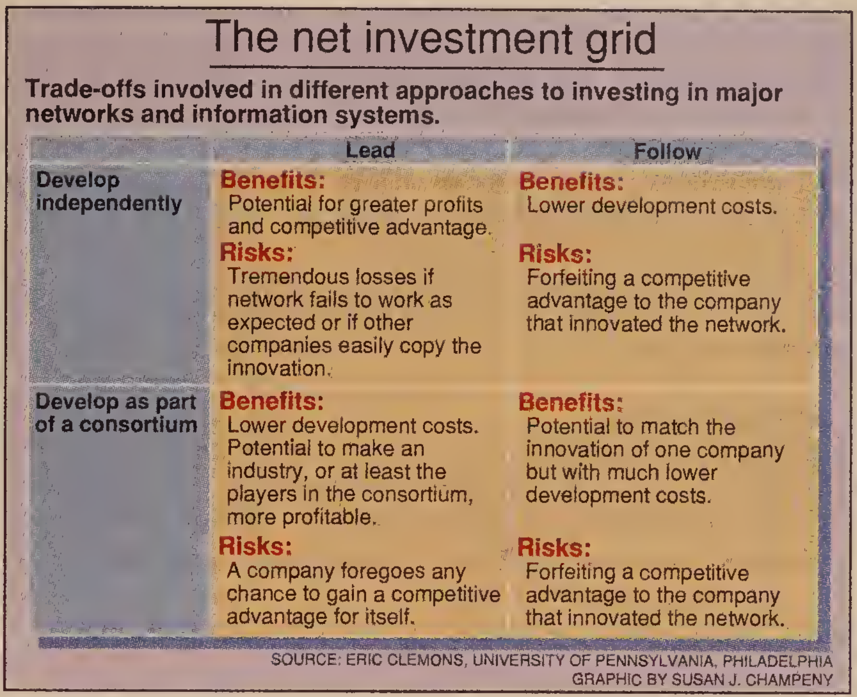
"If there is a problem in the company that demands immediate attention, the manager at headquarters is better able to step forward and gain visibility by providing a solution," Challenger said.

In contrast, managers in field offices may not even learn of a problem at headquarters until it has already been resolved. Thus, they lose a valuable opportunity to demonstrate their abilities.

Challenger also said managers can improve their chances for advancement by choosing jobs that have a high degree of visibility.

These positions may be more stressful than less visible jobs, but they offer more chances for recognition, according to Challenger.

Finally, managers can increase their visibility by making their accomplishments known to their supervisors. ◻



The net investment grid

Trade-offs involved in different approaches to investing in major networks and information systems.

	Lead	Follow
Develop independently	**Benefits:** Potential for greater profits and competitive advantage. **Risks:** Tremendous losses if network fails to work as expected or if other companies easily copy the innovation.	**Benefits:** Lower development costs. **Risks:** Forfeiting a competitive advantage to the company that innovated the network.
Develop as part of a consortium	**Benefits:** Lower development costs. Potential to make an industry, or at least the players in the consortium, more profitable. **Risks:** A company foregoes any chance to gain a competitive advantage for itself.	**Benefits:** Potential to match the innovation of one company but with much lower development costs. **Risks:** Forfeiting a competitive advantage to the company that innovated the network.

SOURCE: ERIC CLEMONS, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA
GRAPHIC BY SUSAN J. CHAMPENY

Paper offers guide for net investments

Professor develops guidelines for when and how to invest in technology for competitive edge.

By Barton Crockett
Senior Editor

PHILADELPHIA — Choosing whether or not to invest in a multimillion-dollar strategic networking project can be one of the toughest decisions a company ever faces.

Investing in the wrong technology, or foregoing investments altogether, can cost dearly in terms of a company's long-term competitive position.

Little literature has been published to date to help guide executives through this decision making process. A professor at The Wharton School at the University of Pennsylvania here, however, recently published a paper that may offer some help.

The paper, "When to Lead, When to Follow, and When to Go Your Own Way: An Analysis of the Available Options When Investing in Information Technology," outlines standard alternatives companies should evaluate when considering strategic networking initiatives.

Published by Professor Eric Clemons in March 1988, the paper only recently became publicly available. It was embargoed for several months after the publishing date so the handful of companies that funded the research could digest the findings.

The first step

According to Clemons, the first step in evaluating strategic networking initiatives is to predict what effect the technology may have on an industry.

Certain network-based information systems can radically change the way an industry does business.

Examples include, according to Clemons, electronic order-entry systems in the drug wholesaling industry and computer reservation networks used by airlines.

If a networking initiative has the potential to alter an industry, a company has basically four options, which Clemons arranged in a two-by-two matrix (see graphic, this page).

The first option, in the upper left quadrant of the matrix, is to develop the network initiative first and alone. Companies should pursue this alternative, according to Clemons, if they are convinced that the project will give them a competitive advantage.

Investing in the wrong technology, or foregoing it altogether, can cost a company dearly.

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Developing such networks first will maximize profits and put competing firms at a disadvantage, since building competing networks is always expensive and sometimes impossible. Yet proceeding first and alone is also risky, Clemons cautioned.

"It has been extraordinarily difficult to protect information system innovations" through patents, as trade secrets, or by developing proprietary technology, Clemons wrote. If a firm believes an innovation cannot be protected, it should consider one of the

(continued on page 22)

INTUG exec blasts EC telecom policy

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would help bring the price of leased circuits in line with actual costs, among other things.

"It's clear the [European Commission] is not remaining true to the guidelines of the Green Paper and the wishes of the Council of Ministers," McKendrick said. "Its choice of words allows for a loose interpretation favoring groups that might be reluctant to participate in an open and competitive market."

INTUG initiatives

INTUG is now urging government officials from the U.S., U.K., the Netherlands and other jurisdictions that favor an open telecommunications market to press the European Commission to revise the directives.

The group also issued a report last week that examines how the recent directives may affect business users.

The report, called "Telecommunications Initiatives Related to the Single Market in Europe," was especially critical of the European Commission's ONP proposal on leased lines released in January.

"The original thrust of ONP was, in principle, relatively liberal. Now the [ONP] is less aggressive in pushing for a competitive market," the report said. "It tends to reinforce the role of the telecommunications administrations [TA] and does not promote fair competition between the TAs and private service providers."

The report levied several specific charges against the European Commission's ONP proposal. It said the proposal does not cover all categories of leased lines, such as point-to-multipoint lines; that the terms or conditions for using leased lines are ambiguous or confusing; and that the proposal makes ONP leased lines more expensive than non-ONP leased lines. In addition, the report claimed that the proposal permits TAs to deviate from cost-based pricing for leased lines.

PTTs have little to gain

Another problem, according to McKendrick, is that the European Commission group issuing the policy directives is comprised entirely of representatives from PTTs, which have little to gain from a more liberalized telecommunications climate in Europe.

Issue closes August 23

On September 4, Network World will present the results of the 1990 Enterprise Network Budget Survey

Network World in conjunction with TFS Comm/Surv, is conducting the most extensive assessment of 1990 Enterprise Networking Budget trends.

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But hurry, this issue closes August 23.

NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies
An IDG Publication

Paper offers guide for net investments

continued from page 21

other three approaches. Among these is the alternative in the upper right quadrant of the matrix, developing a network alone but after a competitor has pioneered the field.

This strategy enables companies to lower development costs because it is typically less expensive and less problematic to copy an innovator than to pioneer a technology. This path is risky, however, because conceding a head start to a competitor may make it impossible to ever catch up.

Another alternative is joining consortiums, which Clemons places in the bottom left and right hand quadrants of his matrix.

Consortiums have the advantage of dramatically lowering development and operating costs by spreading expenses and leveraging economies of scale. In situations where a network is likely to be copied by every company in an industry, and each company would benefit from the network, Clemons wrote that consortiums are likely to be the best route.

But consortiums also have the disadvantage of precluding participants from using networks to gain competitive advantages. Many firms find it difficult to give up this opportunity.

Consortiums can either lead innovation or follow an innovator. According to Clemons, consortiums that follow innovators can get the one up on pioneers by developing the same capabilities at a lower cost, but this carries the risk of letting the innovator get too great a head start.

There are some networking technologies companies would be better off not investing in at all, Clemons wrote.

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When to hold off

There are some strategic networking technologies that companies would be better off not investing in at all, Clemons wrote. These are typically network applications that can be easily copied by companies throughout an industry, and which, if copied, will reduce profits industrywide.

As an example of this, Clemons cited so-called treasury workstations. Banks supply these workstations to their largest customers, giving them on-line access to bank computers and allowing them to move money largely at will among a variety of accounts.

According to Clemons, treasury workstations were first used by a few leading-edge banks as part of an effort to increase customer loyalty. In practice, however, they were easily copied. Now that nearly every bank offers them, banks have found that they must invest millions of dollars in treasury workstations simply to keep existing customers.

The workstations have also had the unfortunate result for banks of increasing the amount of interest they pay customers. Treasury workstations let bank customers keep more money in interest-earning, rather than non-interest-earning, accounts, Clemons said.

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

Worth Noting

See inside for:

- Upgraded global messaging capabilities for Infonet's value-added network services.

First Look

Modem saves space for Apple, IBM users

Computer Peripherals, Inc. recently announced an asynchronous 2,400 bit/sec external modem for Apple Computer, Inc. microcomputers and IBM Personal Computers and compatibles. The compact **Viva24** modem is designed to stand upright so that it occupies a footprint of less than three inches, saving users space on their desks.

The Hayes Microcomputer Products, Inc.-compatible modem operates at speeds of 2,400, 1,200 and 300 bit/sec, and it works on two-wire dial-up or leased lines. It comes in two models: one with Microcom, Inc.'s Microcom Network Protocol (MNP) Level 5 data compression and one without data compression. The modem conforms to Bell 103 and 212A standards and CCITT V.21, V.22 and V.22 bis standards.

Viva24 is priced at $399 with MNP Level 5 data compression and $299 without it. The product will be available at the end of August.

Computer Peripherals, Inc., 667 Rancho Conejo Blvd., Newbury Park, Calif. 91320; (805) 499-5751.

Microsoft Windows-based software bows

Future Soft Engineering, Inc. recently released a new IBM 3278/3279 terminal-emulation software package based on Microsoft Corp.'s Microsoft Windows.

The **DynaComm 3270 Synchronous Edition** software offers pull-down menus, multiple overlapping windowing for multitasking, mouse support and a graphical interface. Because it can talk directly with IBM's 3270 emulation card, the package can

(continued on page 26)

New optical transceiver makes debut

By Laura DiDio
Senior Editor

FRAMINGHAM, Mass. — Photonics Corp. recently introduced a point-to-multipoint infrared device that can be used as a low-cost alternative to stringing wire for local networks or linking terminals to host systems.

The Photolink is an optical transceiver with four telephone-type ports that can be used to link local devices to remote machines outfitted with other Photolinks. The transceiver supports the speed of the particular network or terminal standards utilized.

Initial implementations of Photolink, scheduled to ship this fall, will support RS-232 connections for ASCII and ANSI terminals as well as Apple Computer, Inc.'s LocalTalk network, which runs at 230K bit/sec, according to Dick Allen, founder and president of Photonics.

The RS-232 version of the product can support up to 32 terminal links on a single 1M bit/sec channel. When used with local networks, the device is intended to accommodate the same number of nodes as the underlying network. The Apple LocalTalk version supports a virtually unlimited number of users.

Support for 4M bit/sec token-ring and 3270 terminals will follow in mid-1990, with Ethernet support due out in mid-1991, Allen said.

The microprocessor-based Photolink transceiver — which employs infrared technology similar to that used in television remote control units — contains a set of 10 infrared LEDs used to generate optical signals and a photo diode used to receive the signals, Allen said.

The device generates signals that are bounced off office ceilings to the photo diodes in remote Photolink units. The photo diode converts the optical signal into an electrical signal.

When used with local networks, the device relies on the ac-

(continued on page 26)

Tool kit lets developers automate data transfers

By Tom Smith
New Products Editor

UPLAND, Pa. — Cone Software Laboratory, Inc. recently introduced a personal computer-to-mainframe application development tool that enables users and programmers to automate complex terminal sessions.

Portal runs on an IBM Personal Computer, XT, AT, Personal System/2 or compatible and can be used to develop applications that work with any on-line mainframe software, including CICS, TSO and the IBM Database 2/Query Management Facility.

> Portal runs on an IBM Personal Computer, XT, AT, Personal System/2 or compatible.
>
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With Portal, developers can create applications that bring on-line mainframe data into personal computer applications or allow personal computers to access mainframe data bases without complex data transfer procedures or copying files.

Portal consists of two modules: an application development tool for programmers and a run-time portion for tailored end-user applications.

The Portal Transfer Builder module is used to create Portal Transfer Scripts, which automate data transfer. The module defines command sequences needed to perform file transfers and makes it possible to execute the scripts by hitting a single key.

Portal run-time modules are available for DOS or as a library of compiled modules for personal computer applications written in Microsoft Corp. C, BASIC and other common personal computer languages.

Portal makes it possible for personal computers to share data with multiple host systems without manual rekeying.

It also provides an enhanced user interface for existing applications and upgrades the functionality of host applications being accessed by personal computers.

Portal is priced at $5,000 for a single-user license. Ten-user licenses cost $7,500; a corporate license is priced at $17,500. It is available now.

Cone Software Laboratory can be reached in writing at Crozer Mills Enterprise Center, 600 Upland Ave., Suite 210, Upland, Pa. 19015, or call (215) 499-7440.

AT&T, Hitachi boost Group III facsimiles

Machines offer advances in store-and-forward functions, memory and messaging capabilities.

By Tom Smith
New Products Editor

AT&T and Hitachi America, Ltd. recently introduced Group III facsimile machines with advanced capabilities.

AT&T rolled out four fax machines, the most advanced of which offers a store-and-forward feature with a 57-page memory capacity.

Hitachi's Hifax 47, one of two machines unveiled by the company, provides users with enough memory for 100 names and phone numbers, which can be displayed on an LCD screen and dialed by pushing one button.

AT&T's new faxes are the 9035FX, 9025FX, 4525D and 4515D.

The 9035FX and 9025FX both feature a notify capability that enables the machines to dial the intended fax recipient's telephone and play a prerecorded message informing them that a document has arrived.

The notify function will also activate the message light on an AT&T Merlin Communications System.

The 9035FX and 9025FX restrict fax and voice calls by area code, time of day and through the use of passwords.

They automatically size documents to the receiving machine's capability, offer a 30-page automatic document feeder and accept a 328-ft. roll of thermal fax paper. Their autodialing capability can accommodate 28 numbers dialed by using one button and 90 numbers dialed by pushing two buttons.

The 9035FX, targeted at high-volume users who receive lengthy documents, boasts a store-and-forward function with a 57-page memory capacity that will enable users to store documents and broadcast them at night, when long-distance rates are lowest, to as many as 300 preprogrammed numbers. Incoming material can also be stored if the paper supply runs out.

AT&T's mid-range offerings

AT&T's mid-range 4515D comes equipped with an AT&T Trimline telephone, which has a 12-number speed-dial memory. The 4525D can be programmed with 24 one-touch and 90 two-touch numbers for dialing. It lets users record a message informing callers that they have reached a fax number rather than a telephone number.

All four of the new AT&T faxes operate at 9.6K bit/sec and transmit at 15 seconds per page. Their error-correction mode alerts the sending machine of transmission errors and asks the remote machine to resend the document during the same call, eliminating the cost of a second call.

The 9025FX is priced at $2,895, and the 9035FX costs $3,695. Both will be available in August. The 4515D is priced at $2,195, and the 4525D costs $2,595. They will both be available in September.

AT&T can be reached by writing to 999 Jefferson Road, Parsippany, N.J. 07054, or by calling (201) 581-5619.

New Hitachi faxes

Hitachi's new machines include the Hifax 38 and Hifax 47.

Hitachi's Hifax 38 uses Optical Marking Auto Dialing (OMAD) cards, which are filled out by hand by the sending party and placed before each document to be transmitted.

> OMAD cards permit delayed transmission so users can take advantage of phone rates. They also transmit to a fax with memory.
>
> ▲▲▲

The machine reads from the cards information such as the number to be dialed, time to be transmitted and any modifiers, such as fine resolution or broadcast instructions.

OMAD cards permit delayed transmission so users can take advantage of time-sensitive telephone rates. The cards can also relay transmission to a fax with memory, such as the new Hifax 47, which can, in turn, broadcast a document. In addition, the cards allow polling of other machines to determine if they have stored information to be sent.

The cards support both secure polling, through the use of passwords, and open polling. Open polling enables any user to poll the fax, according to Kevin Moody, regional sales manager

(continued on page 26)

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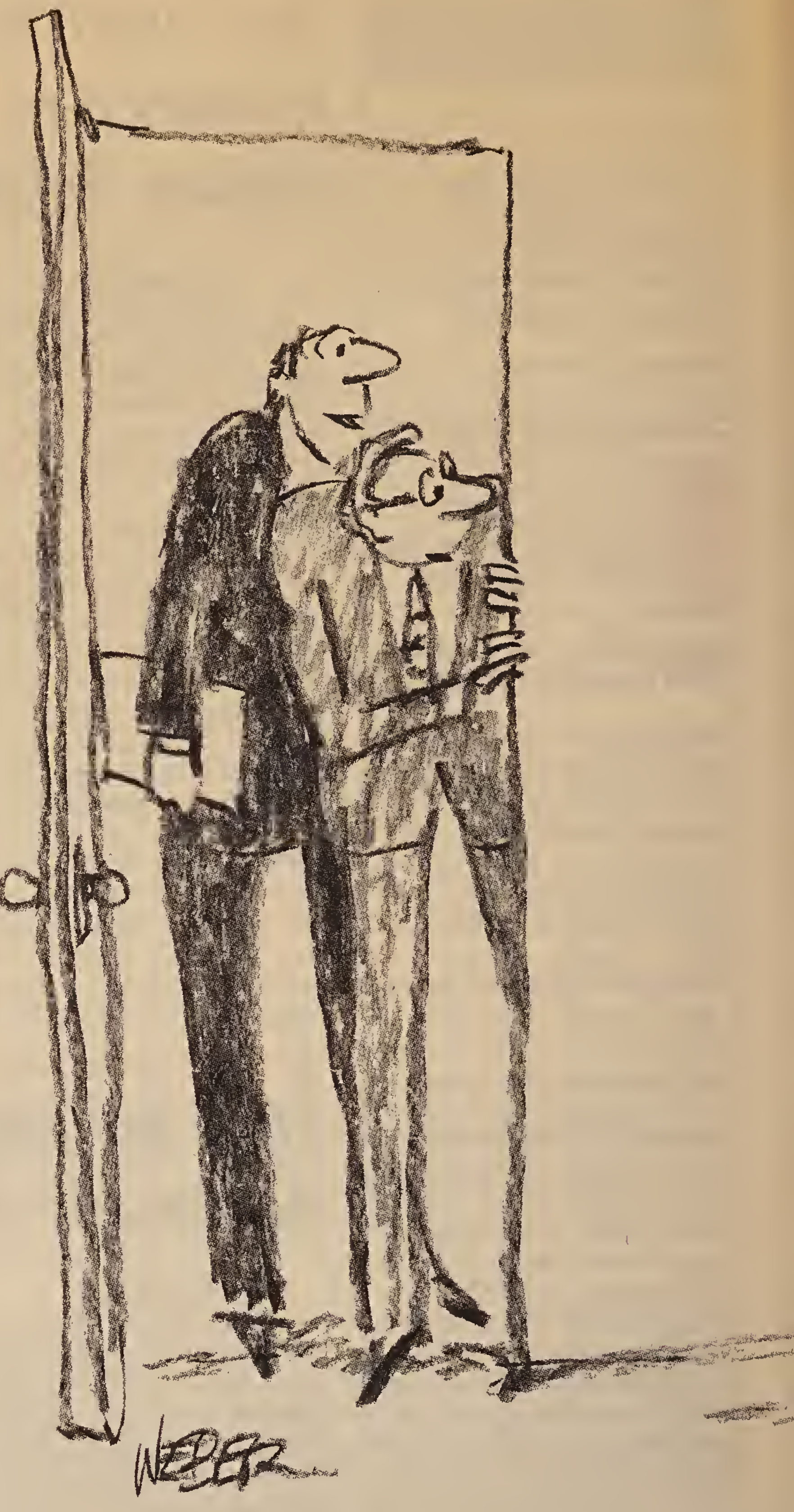

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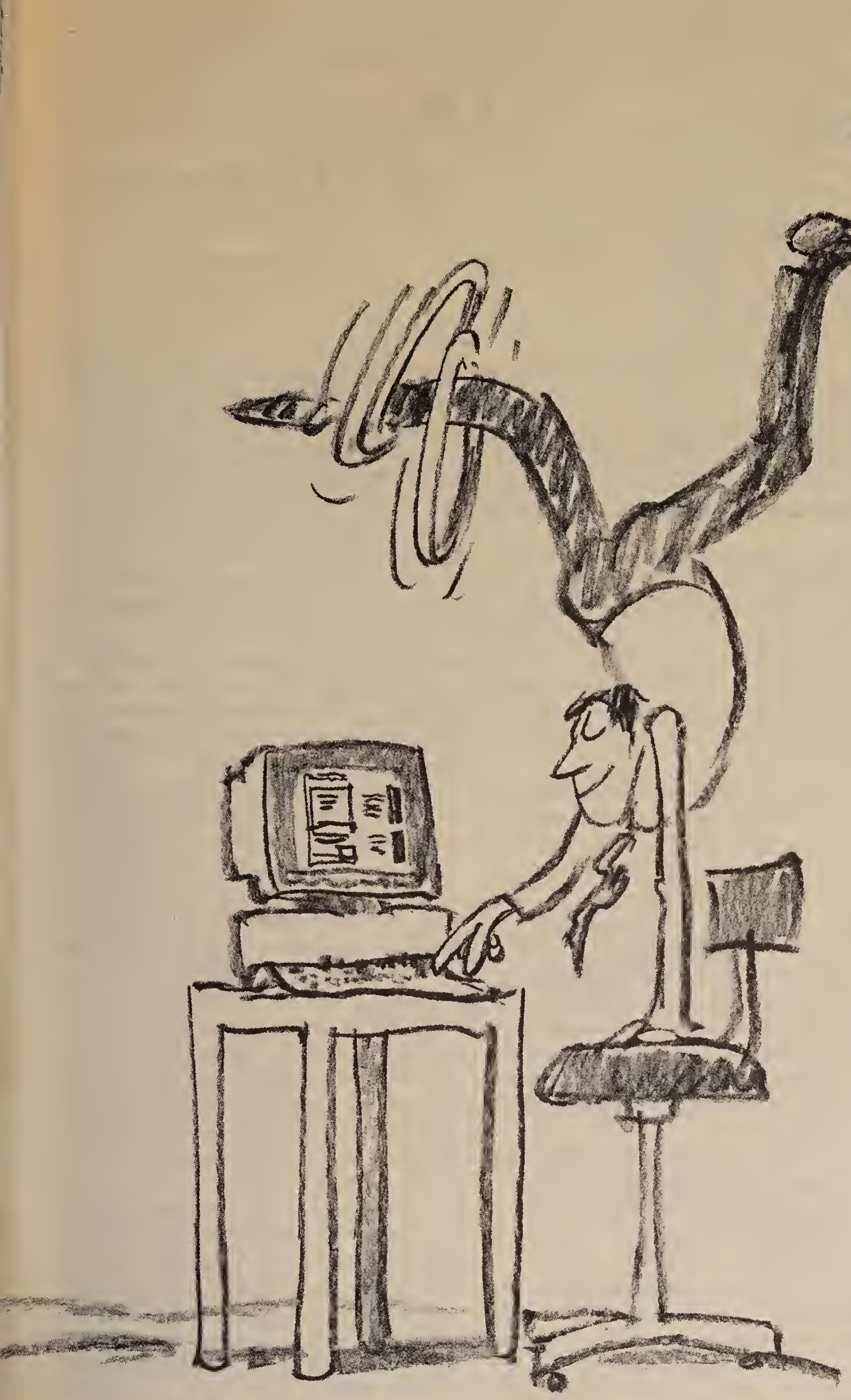

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First Look

continued from page 23

save as much as 100K bytes of memory over similar packages that cannot address the hardware directly, said Tim Farrell, president of Future Soft Engineering.

The DynaComm software uses an advanced script language that includes capabilities such as conditional execution, tabular data manipulation, subroutine execution and event handling using WAIT and WHEN commands. This language gives users the tools to create full-scale graphical communications applications.

The DynaComm 3270 Synchronous Edition requires Microsoft Windows/286 or Windows/386 and will run on IBM Personal Computers, Personal System/2s and compatibles with IBM or Digital Communications Associates, Inc. Irma 3270 emulation adapters. The product costs $295.

Future Soft Engineering, Inc., 1001 S. Dairy Ashford, Suite 203, Houston, Texas 77077; (713) 496-9400.

Verilink kit eases enhancement of 551V List 1, 2 and 3 CSUs

Verilink Corp. has introduced a retrofit kit that can be used to upgrade its 551V List 1, 2 and 3 superframe channel service units (CSU) to meet extended superframe format (ESF) interface requirements without rewiring or replacing existing 551V shelves. The retrofit kit includes plug-in replacements for the Signal Monitor Unit and repeater modules residing in the 551V List 1, 2 and 3 CSUs.

ESF gives T-1 users the ability to monitor network performance while the circuit is in service without disrupting or interfering with the payload.

The 551V ESF/R CSU stores performance data regarding errored, failed and bursty seconds. This information is retrieved through Verilink's Verinet, a computer-based T-1 net surveillance system.

The retrofit kit is available now from Verilink for $2,150.

Verilink Corp., 145 Baytech Drive, San Jose, Calif. 95134; (408) 945-1199.

Infonet offers PC-to-fax option for VAN services

By Susan Breidenbach
West Coast Bureau Chief

EL SEGUNDO, Calif. — Infonet last week added a personal computer-to-facsimile capability to the global messaging options available to users of its value-added network services.

The new Notice-Fax service joins Infonet's Notice-Desktop and Notice-PC products. Together, they enable personal computer users to send text and data as electronic mail, telexes or faxes.

From a personal computer equipped with either Infonet software or a standard personal computer communications package and a modem, a user can send messages to fax machines around the world via Infonet's X.25 network. The user only needs to know the telephone number of the recipient's fax machine.

If a fax machine is busy, the Infonet service automatically resends the message until it is received. It then provides a confirmation to the sender. Notice-Fax includes a directory that can be used to store address information about frequently messaged destinations. It also has a broadcast capability for sending the same document to multiple fax machines.

Notice-Fax provides users with a form-building feature for creating forms that can be filled in and sent via Notice-Fax. The system automatically keeps track of all transmissions and can generate reports that provide a complete accounting of Notice-Fax usage.

Infonet said the cost of using the Notice-Fax service varies from location to location. However, it is less expensive than making a long-distance telephone call between the same two points and offers the additional benefit of providing the user with a hard copy of the message, according to the company.

Infonet's personal computer-based Notice-Fax service costs $100.

Infonet can be reached by writing to 2100 E. Grand Ave., El Segundo, Calif. 90245, or by calling (213) 335-2600.

AT&T, Hitachi boost Group III facsimiles

continued from page 23

for Hifax products at Hitachi.

OMAD cards allow preprogramming of an unlimited quantity of numbers to eliminate misdialing. They also allow users to load multiple transmissions in the document feeder up to the 25-page limit of the Hifax machine, Moody explained. As the machine detects the next OMAD card, it disconnects the previous call.

Hitachi's Hifax 38, which transmits a page in 15 seconds, gives users the ability to record an eight-second message identifying themselves or their company to the sending party, Moody said. The recording would tell the calling party if they have mistakenly dialed a fax number, saving them from hearing the piercing noise associated with misdialing a fax telephone number.

Other features of Hifax 38 include: superfine transmission mode that generates images with 400 horizontal and 200 vertical dots per inch; a built-in handset; 20 single-button speed-dial keys and 80 telephone number codes for abbreviated dialing.

Superior half-tone resolution

Hitachi's other new offering, the Hifax 47, offers users the ability to scroll through its LCD dial bank of 100 names and phone numbers and transmit a document by pressing one button.

The Hifax 47, which also uses OMADs, employs an advanced algorithm for superior half-tone resolution, eliminating the fuzziness sometimes associated with fax transmissions, according to Moody. "Hifax 47 prints a dot pattern similar to a bit-mapped graphic printout from a computer," he said. "It's very true to the original, almost like a magazine or newspaper picture."

When communicating with another Hifax 47, the device uses data compression to transmit a page in nine seconds, compared with 15 seconds for regular transmissions. It also features a proprietary and a CCITT-compatible error-correction mode for retransmission of documents with errors.

Optional 1M-byte and 2M-byte memory boards are available for the Hifax 47. With the boards, the Hifax 47 can support sequential broadcasting, as well as generate confidential transmissions, through which a user enters a password to access a document from memory.

In addition to the 100-number dial bank, the Hifax 47 has 40 preprogrammable, single-key dialing buttons. It has a 50-sheet document feeder, a send stamp and a handset.

The Hifax 38 is priced at $2,395, and the Hifax 47 costs $2,895. Both will be available in August. The 1M-byte memory card costs $600, and the 2M-byte card is priced at $1,200. The cards will be available at the end of August.

Hitachi America's Telecommunications Division can be reached by writing to 2990 Gateway Drive, Norcross, Ga. 30071, or by calling (404) 446-8820.

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New transceiver makes debut

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cess methods employed by the nets to accommodate contention.

With terminals that do not support network protocols, users need to use wiring concentrators that support a Photonics-developed proprietary RS-232 access protocol. The concentrator is used to demultiplex the terminal connections to individual computer ports.

A light indicator on the back of the transceiver flashes green during regular data transmission and changes to red in the event of a problem or if the signal is interrupted. Since the beam of light is diffused, rather than concentrated, the data transmission signal won't be interrupted by passersby.

According to Allen, the worst-case scenario would be if the Photolink is knocked off its mounting. In that case, the infrared signal is broken and data transmission stops.

The device is being marketed for users in open office environments. Nearly 70% of domestic offices are open or partitioned, according to the International Facilities Management Association, a market research firm in Houston.

For the remaining 30% of private or closed offices, Photonics will make Photolink fully compatible with existing cabling such as twisted-pair telephone wire, thin- and thick-wire Ethernet and fiber-optic cable.

Photolink differs from other infrared products in that it distributes data by reflecting a diffuse signal off the ceiling. Other infrared devices use line-of-sight signaling and can link only two computers at a time, Allen said.

Photolink is currently in beta test at several firms including Apple, which is a major investor in Photonics, he said.

The Photolink transceiver is priced at $995 and will ship in September. A wiring concentrator, which also costs $995, is required for RS-232 terminal hookups.

For more information, contact Photonics at 200 E. Hacienda Ave., Campbell, Calif. 95008, or call (408) 370-3033.

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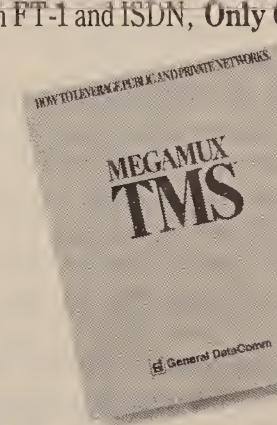

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OPINIONS

NETWORK COMPUTING

BY JAMES KOBIELUS

Inching up the evolutionary ladder

If only you had a silver dollar for every time someone's said, "The network is the computer." There is, of course, some substance to the notion of "network computing." This catchphrase has been applied correctly to value-added networks, distributed data bases and cooperative processing.

What all these configurations have in common is that their widely dispersed components support applications traditionally provided by single processors. As such, these distributed systems are to lone computers what multicellular organisms are to amoebas: creatures of a higher order.

However, real-world networks generally lack the equivalent of an operating system. There is no single point of control and service coordination among all components. What we have instead is a panoply of standards that facilitate communications among device-level operating systems but offer few resources for developing integrated network applications.

What's required are network architectures and application development environments that enable users to drive their networks as unified machines. Until such tools become generally available, most networks will remain the same imperfectly integrated, Rube Goldberg constructions they have always been.

> Real-world networks generally lack the equivalent of an operating system.
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Fortunately, these tools and the network architectures that support them are being introduced at a healthy clip. The most basic level of network computing — which includes parallel processors and clustered computers — has brought forth a growing assortment of compilers. One step up, at the local-area network level, are new generations of network operating systems, application programming interfaces and other environments geared to cooperative processing.

And there's an even higher level of network computing on the horizon. One doesn't often consider using the public telephone network as a platform for privately developed applications, but it is technologically possible and, in fact, will become quite common with the implementation of Open Network Architecture (ONA).

The role of the network operating system under ONA will be played by "service control points," which are centralized data bases that coordinate service delivery by issuing real-time instructions over common channel signaling links to dispersed network switches. Users will be able to access this network operating system directly to build integrated, distributed network applications.

Eventually, the major carriers will provide on-line programming environments, allowing users to configure basic network capabilities into an infinite variety of new service packages. For example, a user might build a package combining the transmission bandwidth of T-1 service, the network management capabilities of Centrex service and the calling party identification features of Integrated Services Digital Network, topped off perhaps by a unique custom-programmed billing arrangement.

This will represent an evolutionary step up from the customer-controlled reconfiguration (CCR) capabilities available today with some carrier offerings. Most current CCR offerings merely allow for automated service provisioning within predefined service packages. ONA will also make possible a greater interpenetration of public and private networks since users will be able to supplement their private networks with the full pallet of common carrier offerings.

Kobielus consults on information technology in Alexandria, Va.

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EDITORIAL

Renominating Diaz Dennis would grease FCC's wheels

The Federal Communications Commission is finally grinding to a halt after years of Republican neglect.

Unfortunately, network users stand to bear the brunt of the consequences, as the agency may very well be handcuffed from making any decisions well into this fall.

Lame duck Commissioner Patricia Diaz Dennis recently issued her second, and most damaging, recusal — a process in which the commissioner removed herself from voting on certain issues.

Diaz Dennis excused herself from virtually all FCC proceedings due to a possible conflict of interest caused by her employment negotiations with MCI Communications Corp.

That's not to fault Diaz Dennis; she's done an admirable job as commissioner. Her dealings with MCI are in her best interests, given her term as FCC commissioner has lapsed.

However, Diaz Dennis' removal from the proceedings leaves the FCC short of a quorum with only James Quello and Dennis Patrick serving as commissioners. In fact, Patrick too is on the way out, having announced his resignation earlier this year.

But the impact of Diaz Dennis' recusal may well be felt beyond the FCC voting chambers. Without the necessary complement of commissioners, the FCC can't even take corrective policing actions when a user cries foul over some carrier atrocity.

The FCC is now unable to issue decisions on almost all tariffs, tariff investigations, rulemaking proceedings, complaints and enforcement action involving telephone companies.

President Bush has to be held partially responsible for this mess. Bush, of late, has been winning points in political circles for his efforts on the environment and foreign affairs.

> Without the necessary complement of commissioners, the FCC can't even take corrective actions when a user cries foul.
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In fact, Democratic poll taker Peter Hart even quipped recently, "I sort of have this feeling I'm watching one of those knuckleball pitchers. You can't believe he'll get past the third inning, but, gee, he's still in there and the ball's fluttering."

Looking at the FCC's current situation, it's clear that Bush has been throwing nothing but flutterballs and curves to U.S. businesses that depend on the FCC to maintain a fair market.

Bush could have, and should have, nominated FCC appointees soon after he took office last January. Instead, he let the FCC problem fester and named no one until June.

But Bush isn't totally responsible. The FCC's situation dates back to the Reagan administration, when the former president let key positions remain vacant. Interestingly, those vacancies were to be filled by Democratic nominees.

Now it appears Bush is playing politics with his nominations. All three of his FCC nominees — Alfred Sikes, Sherry Marshall and Andrew Barrett — are Republicans.

On the other hand, Diaz Dennis is a Democrat. And Bush let her term expire this past June 30, leaving Quello as the only Democrat on the commission.

Now the FCC is in a bind. There are at least 21 pending tariff investigations that must be completed by this November, according to rules that Congress added last year to the Communications Act of 1934. The rules require the FCC to complete all pending tariff investigations.

Even if the new commissioners step in by September, it's unlikely they'll have the necessary knowledge to make an informed decision so soon.

It's time for Mr. Bush to stop doing what's best for his political party and do what's best for his constituents: Renominate Diaz Dennis for a five-year term. It's the only surefire way to get the wheels of the FCC moving again.

INFORMATION SECURITY

BY JOHN ZALUBSKI

Threat of viruses must be taken seriously

Information security is now receiving more attention in trade journals and the general news media than ever before. Numerous vendors are providing enhanced security equipment involving encryption schemes, cryptographic equipment and network access control devices.

However, while new encryption schemes and devices are welcome developments for information security managers, they do not attack the root of the problem: the overall lack of awareness and attention that network security issues receive from management and users alike.

Managers' weak spots

Network security managers have identified several areas in which managers and users are deficient when it comes to security. First, managers and users have casual attitudes toward security procedures. Protecting information involves performing inspections, changing user passwords, meeting Transient Electromagnetic Pulse Emanations Standard requirements for government environments and limiting the number of users who are given access to certain information.

Many managers and users see these procedures as inconveniences that prevent them from completing tasks in a timely and efficient manner. Some of these procedures *are* inconvenient and *do* get in the way. But basic rules and regulations that involve controlling and restricting access and accounting for all cryptographic keys and equipment should never be removed and should be improved upon.

General security awareness when dealing with sensitive or classified data is another area in which both managers and users are lacking. General security awareness involves many different factors, ranging from changing user passwords on electronic mail systems to implementing Data Encryption Standards over a network to encrypt transmissions.

A basic principle of communications security awareness is, "Does the user need to know this information?" In most security circles, this is called "need-to-know access." Although this is a standard on which numerous security principals are based, it is often ignored — especially in the areas of network planning and management.

Newspapers are filled with accounts of unauthorized personnel accessing financial networks or credit reporting systems and using this information for their own benefit. In these cases, either communications security issues were not considered or the probability of harm coming from unauthorized access was not considered a threat.

> The network manager's policies concerning security must be supported by the user and enforced by management.
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Computer crime on the rise

Network planners and managers who have had information on their networks intercepted by sophisticated criminals are not the only ones who lack awareness. During the course of day-to-day business operations, many users have telephone conversations and send data over unsecured lines. They provide unauthorized personnel with authentication data to access certain computing facilities and ignore reminders to change passwords.

Although in most cases no harm is intended or inflicted, disgruntled employees or computer criminals can capitalize on opportunities such as these. White-collar computer crime results in losses of $5 billion per year, a large portion of which results from allegedly harmless exchanges of information.

A third deficiency is the way network managers are supported when dealing with communications security issues. Managing a network with both sensitive and nonsensitive information is a challenge for any network manager. In most cases, network security is an additional duty that network managers must take on, typically without training.

I remember the first time I managed sensitive information and the type of training I received. The outgoing manager responsible for communications security looked at me and said, "Hello. Here are three books you need to read. Everything is in great shape. Good luck."

Security information management is challenging enough without having to learn it on the job.

Training needed

Management must invest time and money when tasking an inexperienced network manager with the additional responsibility of managing network security. The support must not stop with academic instruction. Company-unique policies and procedures must be developed by the network manager and supported by the management structure.

Included in these company policies should be mandatory security awareness training for any personnel involved with sensitive information. These guidelines must be followed by the personnel involved and enforced by management. Network managers often ask management for assistance and support on network security issues. Either the support is not received or it is provided only when a problem occurs.

In summary, the network manager's guidelines and policies concerning communications security must be supported by the user and enforced by management. We all need to rethink our attitudes about information security and the procedures required to protect information.

Additionally, security awareness must constantly be improved and enhanced by managers and users alike. Communications security managers have been repeating this message for years, but it is not being heeded by everyone.

Supporting your network manager's security-related efforts and policies may prevent your organization's funds from ending up in the bank accounts of white-collar computer criminals. ◻

Zalubski is a senior consultant with Network Strategies, the network consulting practice of Ernst & Whinney located in Fairfax, Va.

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BY FRANK AND TROISE

Great Moments in Telecommunications

May 12, 1980

The concept of the Employee Retreat is cautiously introduced into the Telecommunications Industry.

LETTERS

Networked systems rule

The article entitled "CBS-Fox Video abandons mainframe for local nets" (*NW*, July 10) reflects one more sound strategic decision to improve corporate productivity while reducing information processing costs.

This gradual decline in mainframe domination really started before the advent of the first personal computers. Actually, it started many years ago — in the minds of all those innumerable corporate users who were becoming increasingly dissatisfied with the cost-effectiveness of the services they were receiving from MIS. This, however, was not MIS' fault in many cases.

The voluminous batch reports and the mainframe's inherent rigidity could not quite answer these users' what-if questions effectively. Consequently, traditional centralized processing started to lose its luster.

Well, one cannot satisfy

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Network World *welcomes letters from its readers.*

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Getting graphic

New networks are still failing to meet the speed and bandwidth needs of graphics specialists.

By KRIS HERBST

Most users of high-end graphics workstations and supercomputers can only dream of the day when they will be able to access networks that can handle streams of graphics and image data measured in gigabits per second.

Graphics specialists welcome the arrival of the latest generation of 10M and 16M bit/sec local-area networks and the development of 100M bit/sec Fiber Distributed Data Interface (FDDI) networks. However, users are finding that these network speeds fall short, by an order of magnitude, of the bandwidths required to transmit complex graphics files.

The graphics industry's hunger for bandwidth has become particularly acute. This was evident at the Engineering Workstation Conference held in Boston early this spring.

The focus has shifted from ever more powerful workstations to concern about how to achieve the proper balance between networking capability, processor speeds and memory access times, according to Lynn Thorsen, graphics manager at Evans & Sutherland, a Salt Lake City-based vendor of high-end graphics, modeling and simulation products. "Networking is becoming a critical issue," she says.

Graphics specialists who work in animation studios, industrial workshops that use sophisticated computer-aided design and manufacturing systems, and scientific visualization laboratories manipulate real-life images captured by cameras and scanners or create their own three-dimensional, animated graphics.

The final product may be an entertaining fantasy, a streamlined visualization that helps viewers comprehend real-life phenomena and scientific equations or a detailed photorealistic image. These methods are being merged in a new discipline called image processing, which blends real-life images and synthesized graphics.

Data intense

Production of these sophisticated graphics is an extremely data-intensive process because it is designed to take advantage of the human brain's ability to receive and analyze visual information. Scientists estimate that the brain's visual input channel processes information at a rate equivalent to about 2G bit/sec.

The internal bus speeds of some of the more powerful graphics-processing computers approach the speed of the human eye/brain system. However, oftentimes, these devices must be externally linked to other specialized servers to avoid tying up an expensive processor and to accelerate completion of graphics-processing tasks. In any case, these advanced com-

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Herbst is a free-lance writer based in Washington, D.C.

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FINISH

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puters are virtually always shared by a pool of users.

Time-sharing arrangements, which have created bottlenecks that restrict the usefulness and availability of these processors, are being replaced by distributed networks of high-powered workstations, graphics supercomputers and specialized graphics devices.

"The bottlenecks of time sharing have been eliminated because each user has his own CPU and high-performance graphics device," says Rod Gentilli, group manager responsible for mechanical engineering at the Apollo Division of Hewlett-Packard Co. in Chelmsford, Mass. "Network computing, traditionally called the client/server model, is in vogue today."

Network computing

The evolution of token-ring and Ethernet networks has made network computing possible. Users of high-end graphics devices typically use an Ethernet network running under the Transmission Control Protocol/Internet Protocol and Unix, Thorsen says. Some users prefer token-ring networks for graphical image manipulation because they have better throughput characteristics when heavily loaded with traffic, according to Paul Bemis, a manager of high-end systems at Apollo.

Although these local networks allow connectivity, they can also nullify the enormous increases in the computing speeds of graphics workstations and supercomputers that have been made in recent years because they limit data transmission to speeds in the 10M bit/sec range.

"Hopefully, networking will catch up with the speed of the processor someday," says Craig Mathias, a computer scientist and market strategist for Stellar Computer, Inc. in Newton, Mass. "The standard today in networking is Ethernet, and everybody supports it, but it has nowhere near the bandwidth necessary to build real distributed visualization environments."

FDDI networks will allow speeds up to an order of magnitude faster than current Ethernet and token-ring standards. Running an FDDI network at 200M bit/sec in full-duplex mode will make it possible to do animation in "near" real time, Bemis says.

"FDDI is a solution to the problem of doing animation from precomputed images," he says. "Full-color animation requires a data rate of 3M bytes per frame at about 10 frames per second. That means a data stream of 30M byte/sec, or 240M bit/sec, is required in order to animate a bit map. You need a pretty fast network to do that. We feel the solution to that problem is FDDI."

But others are not as enthusiastic about FDDI. "FDDI is really an Ethernet replacement, in my opinion," Mathias says. "It's going to be wonderful for offices, and we will support it, but it's not going to be fast enough to do visualization work."

For those whose needs will not be satisfied by FDDI bandwidths, the High Speed Channel (HSC) standard, originally conceived at the Los Alamos National Laboratory in Los Alamos, N.M., offers hope for the future. ANSI is preparing a draft standard for the physical-layer definition of a 32-bit, parallel, 800M bit/sec HSC.

"The bandwidth of Ethernet and the bandwidth of FDDI — if and when it follows Ethernet — aren't anywhere near fast enough, and that's why there's a lot of interest in the HSC," says Bob Judd, group leader of the Los Alamos National Laboratory's C6 computer graphics group.

"We'd really like to see bandwidths on the order of 100M byte/sec," he says. "We'd like to eliminate bandwidth as an issue when you start worrying about graphics, particularly in distributed computer environments."

HSC interface

IBM has announced an HSC interface for its ES/3090 computer that conforms to the ANSI draft standard, and other vendors are working on a variety of HSC-based products.

"We will eventually bring out a product based on the HSC," Mathias says. "The HSC is considered very leading edge at the moment. But very high-speed networks on the order of HSC speeds are years away."

IBM has developed its HSC interface under an agreement with Ultra Network Technologies of San Jose, Calif., which has also developed an HSC interface. The Ultra HSC interface off-loads all of the processing of Open Systems Interconnection network protocols to an intelligent host interface card. This frees the entire 100M byte/sec bandwidth capacity of the HSC for data file transfer.

Ultra Network Technologies has also developed a gigabit frame buffer, which is a graphics output device that can be connected to an HSC interface. In addition, the company has just completed beta-testing a 1G bit/sec, multihub network, called UltraNet, based on OSI protocols. UltraNet is designed to serve as a backbone network for Ethernet and other lower speed networks.

Because UltraNet's topology is similar to FDDI, it can share fiber-optic cables with an FDDI network. "UltraNet will not replace or compete with the Ethernets or FDDI, but it will be able to feed them data at higher rates," says Kent Bossange, director of marketing for Ultra Network Technologies. "UltraNet operates in a Unix environment, so it looks like TCP/IP to the host application."

Faster, faster

But even the speeds afforded by the HSC standard will be inadequate for some applications, according to Mathias. Some vendors supply proprietary high-bandwidth interfaces for dedicated links that operate at speeds greater than the HSC.

One of the fastest is Stellar Computer's Data Path Access Port interface board, which transfers data at 320M byte/sec. Although this is more than three times the speed of the HSC, Stellar Computer's interface is much more complex than the HSC and it is not a standard.

"It is much too fast to be used on a LAN anyway," Mathias says. Graphics supercomputers, such as Stellar Computer's GS2000 series machines, which are designed to handle interactive manipulation of 3-D graphics images — the most compute-intensive task involved in graphical image processing — skirt the issue of providing adequate bandwidth on external links by executing as much graphics processing as possible on a single CPU.

Although they look like workstations to the user, Stellar Computer's graphics supercomputers "move data around within the machine at speeds on the order of 3G to 4G bit/sec," Mathias says. "Right now, the only viable approach is to put all the functions, such as computation and rendering, inside one box that's as small as possible to make sure there are no bottlenecks between the functional units."

Network computing can dramatically reduce the time needed for processing.

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But Mathias admits that this approach does not work for many environments, such as scientific labs, "where you've got a lot of different machines and you need to pass data between them." Distributed network computing is becoming a common solution when users need to share high-end graphics resources.

Distributed computing

The operation of a distributed network computing environment is based on distributed computing software and protocols that allow programmers to partition graphics applications so that segments of the applications can be routed to idle CPUs on a multivendor network. This procedure reduces the time needed for processing and is transparent to users.

Proprietary remote procedure calls found in products such as Apollo's Network Computing System (NCS), Sun Microsystems, Inc.'s Network File System (NFS) and Digital Equipment Corp.'s DECnet allow a client computer to call a subroutine on a server and receive the results over a network.

These protocols are important because high-end graphics environments are typically populated by a heterogeneous assortment of devices. These could include workstations that serve as user interfaces, compute servers such as Cray Research, Inc. supercomputers, and special devices such as renderers that add shading, texture and other special effects to enhance the realism of graphical images. A proposed standard, called the RenderMan Interface, makes it possible to split graphics processing into the separate tasks of modeling and rendering.

RenderMan translates the sequence of interactive commands that users need to define the geometric form and movement of an object into the more compact, static terms that a device, called a renderer, uses to produce a final graphical image.

RenderMan was developed by Pixar, Inc. of San Rafael, Calif., a company that was spun off of moviemaker George Lucas' Lucasfilm, Ltd. and has become a leading producer of computer-generated graphical images.

Since its release a year ago, RenderMan has received endorsements from many leading graphical imaging hardware and software manufacturers.

Shared rendering

Producers of graphical images can afford to install less powerful workstations by providing shared access to a separate rendering device over a network.

"The more mainstream, price-sensitive users will typically use a rendering package that distributes the rendering around the network so that they are using network computing — the collective horsepower of all the individual nodes on the network — to create an individual frame in an animated sequence," according to Bemis.

Because, like RenderMan, distributed computing protocols have been developed by private companies rather than standards committees, several protocols are vying to become the industry standard.

Sun's NFS has already been accepted as something of a de facto standard for file transfers in the Unix and TCP/IP worlds, but momentum is slowly building behind Apollo's NCS as a standard for distributed computing.

NCS has the support of more than 100 vendors and has been licensed by three of the industry's heavyweights: IBM, DEC and Hewlett-Packard Co. Unlike NFS, NCS includes a "location broker" that determines which network resources have idle capacity available. Last month, Apollo and DEC made a joint announcement of an extended version of NCS that runs over wide-area networks.

Network computing can dramatically reduce the time needed for processing, depending on the power and number of resources available on a network. Italy's public telephone administration, Italtel, found that using NCS to design circuitry and run validation tests on a network of 10 workstations reduced processing time from 20 hours on a single workstation to just over two hours.

Engineering Army jeeps

The University of Iowa's Center for Design Optimization of Mechanical Systems has used NCS to design the next generation of jeeps for the U.S. Army. By running graphical simulations of the jeep operating under different conditions, the center's engineers were able to complete much of the design work constructing and testing vehicle prototypes.

The engineers used an Apollo workstation — networked with a superminicomputer that could perform numerical processing when idle — to run 3-D wire frame simulations. These simulations allowed the engineers to check various parameters, such as stress on the suspension as the vehicle was exposed to simulated conditions, including turns, accelerations and rough road conditions.

"To do an application like that is incredibly compute-intensive," Apollo's Gentilli says. "If you were to do it on just one workstation, the motion on the screen would be very slow each time you put in a different parameter. But [the engineers] could actually see the jeep going over the road in real time because of the ability to simultaneously distribute this application to more than one computer over the network. And this could be totally transparent to users."

Despite the advantages that standards offer, vendors acknowledge that the price they pay for using standards goes beyond sacrificing the ability to lock in customers with proprietary products.

"Generally, the price you pay with standards is speed," Thorsen says. "Various application developers believe they take a 30% to 50% hit when they use these standards." Nevertheless, Thorsen says, "they still prefer to use them."

The X Window System

It appears likely that the X Window System will become the de facto standard windowing environment for Unix-based systems used in high-end graphics network processing. X Window is a distributed display system that was financed by IBM and DEC and developed at the Massachusetts Institute of Technology to connect MIT's collection of some 500 incompatible workstations.

The X Network Protocol allows transfer of data packets of various sizes across heteroge-

(continued on page 45)

Picture this . . .

CONTINUED FROM PAGE 1

Networking allows students and research colleagues in dispersed geographic areas to share scarce educational resources. As third- and fourth-year medical students must spend most of their time in rotations and at off-campus placements, electronic links are often one of their few ongoing connections to the medical school.

Driving image use

There are more than 120 medical health science centers in the U.S. Some are stand-alone entities; others are subsets of larger universities. Typically, the medical health science center encompasses all the functions of both university and hospital: clinical care (both outpatient and inpatient), academic research, teaching and administration.

As medical service and research institutions, medical health science centers rarely invest in technology purely for its own sake. Rather, investments are made to:

- Improve the quality of clinical care and diagnostics.
- Upgrade the quality of education and the center's competitive position.
- Strengthen the center's referral network by improving the quality and variety of resources.

Image communications developments have tended to focus on

(continued on page 40)

Johnston is a principal with Northeast Consulting Resources, Inc., a Boston-based consulting collaborative concentrating on management, information and communications strategies.

Increasingly, medical imaging networks are challenging traditional network solutions.

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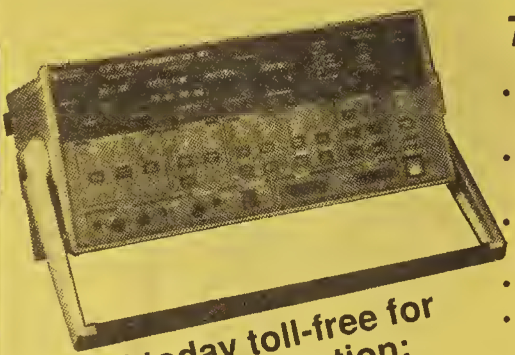

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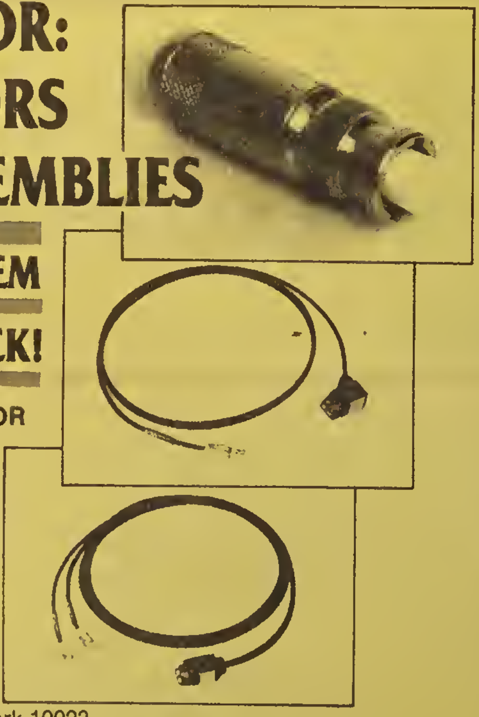

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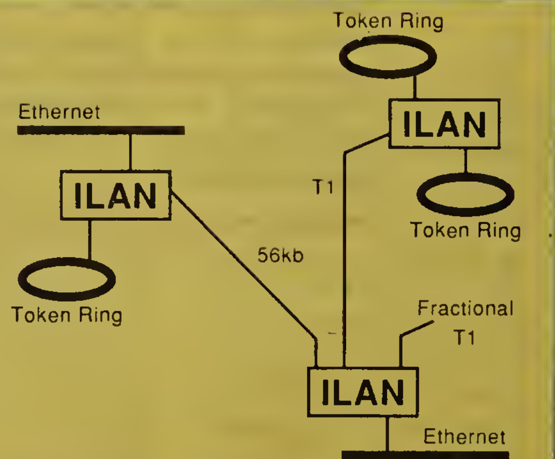

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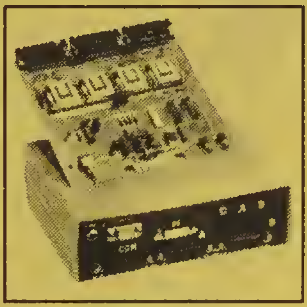

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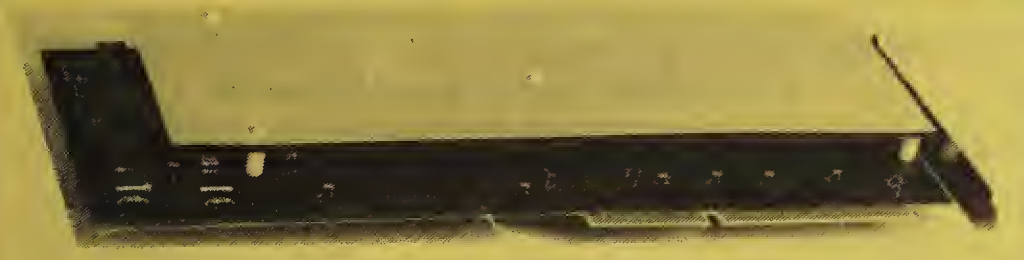

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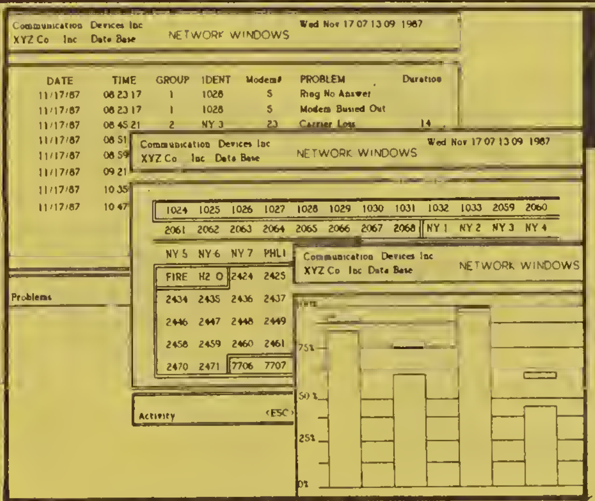

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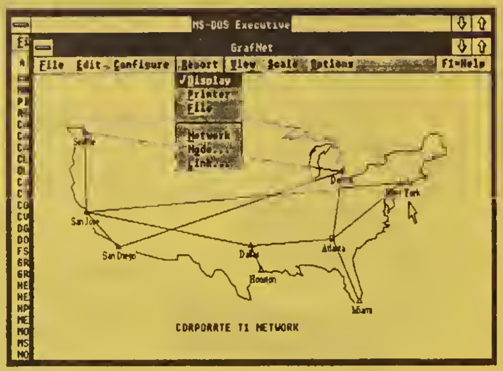

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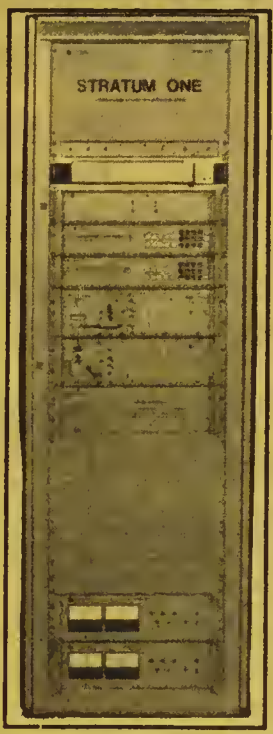

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(continued from page 33)

enhancing the quality and efficiency of clinical care with some transfer into the teaching and curriculum development area as well.

Major areas of activity in image communications include:

- Picture archiving and communications systems (PACS)/Teleradiology, which involves transmission and management of diagnostic images and linkage of textual medical records with image files.
- Biovisualization, which is the creation and manipulation of 3-D data bases to model surgical procedures, aging processes and prosthetic devices.
- Image-oriented computer aided instruction, or student-paced learning on image-oriented topics such as pathology and anatomy.

The addition of image links within campuses and into the wider medical community will drive significant changes in the local- and wide-area cabling, switching and transmission choices selected by these medical centers.

Their experience will be useful to other industries as the use of image information transfer proliferates in the 1990s.

The goal of the PACS is to provide a faster and more efficient means of analyzing, organizing, and archiving patient records.

* * *

The major components of the medical diagnostic image system include:

- Image acquisition devices such as computer-based radiography and X-ray.
- Viewing stations such as nursing stations and multiscreen diagnostic lab stations.
- Archiving and data management systems such as optical disk storage.
- Shared peripheral devices such as film digitizers and laser printers.

PACSs link these components using digital transmission standards defined by the National Electrical Manufacturers Association (NEMA). Systems currently in place in the U.S. tend to be small, linking a few acquisition devices, high-use viewing stations and local storage systems.

Some, such as the Commview system jointly marketed by AT&T and Philips Industries, N.V., can accept a range of input formats, including direct analog video taps, scanners that digitize existing flat films and direct digital taps into the image devices. The input data is then converted to a digital stream for digital transmission via fiber, Ethernet or available standard telecommunications offerings, such as T-1. Users may select image compression ranging from 0 to 16-to-1.

Other systems, such as Siemens Medical Systems, Inc.'s PACS product, use end-to-end digital interfaces and transmit uncompressed raw data to local viewers and to storage. Most use Ethernet links within single campus environments.

Current standards have concentrated on image transmission, storage and retrieval. NEMA is now working on developing standards for linking images to text-based hospital information and medical records systems.

The goal of the PACS is to provide physicians and diagnostic specialists with a faster and more efficient means of analyzing, organizing, archiving and retrieving the full patient record.

Over the next 10 years, medical centers hope to benefit from PACSs through:

- Medical records consolidation and management.
- Reduced film purchasing, processing and storage.
- Distributed access for consultations and referrals.
- Improved information sharing among research institutions.
- Facilitation of problem-based computer-aided pathology and anatomy instruction.

"Doctors are not always experienced with computers and are wary of how they might impact established diagnostic routines," says Gary Roessel, senior product specialist for PACSs at Siemens Medical Systems in Iselin, N.J. "PACSs have to be implemented in a fashion that provides service that is as least as good as, if not better than, the strategies they use now, or the physicians won't accept them."

According to users and vendors, the major factors that will determine the acceptance of the systems are physician diagnostic preferences, cost-justification through advantages such as film production and storage reductions, speed of transmission between buildings, quality of the images and friendliness of the user interface.

Physician preferences may be the most critical factor and also the most difficult to change quickly, a theory that traditional diagnostic film manufacturers such as Eastman Kodak Co. and Polaroid Corp. are betting on.

Polaroid, for example, is readying Helios, a medical digital printer that may provide a halfway point for physicians who want to capitalize on the advantages of digital storage and networking but still want to conduct diagnoses from film.

The product, which Polaroid claims provides consistent image quality across locations, relies on thermal printer-type technology and eliminates the needs for darkrooms and chemicals while providing the physician with on-demand access to a transparent film image.

Many institutions are currently assessing the benefits of PACSs. Several are studying the long-term cost savings of converting to filmless information storage.

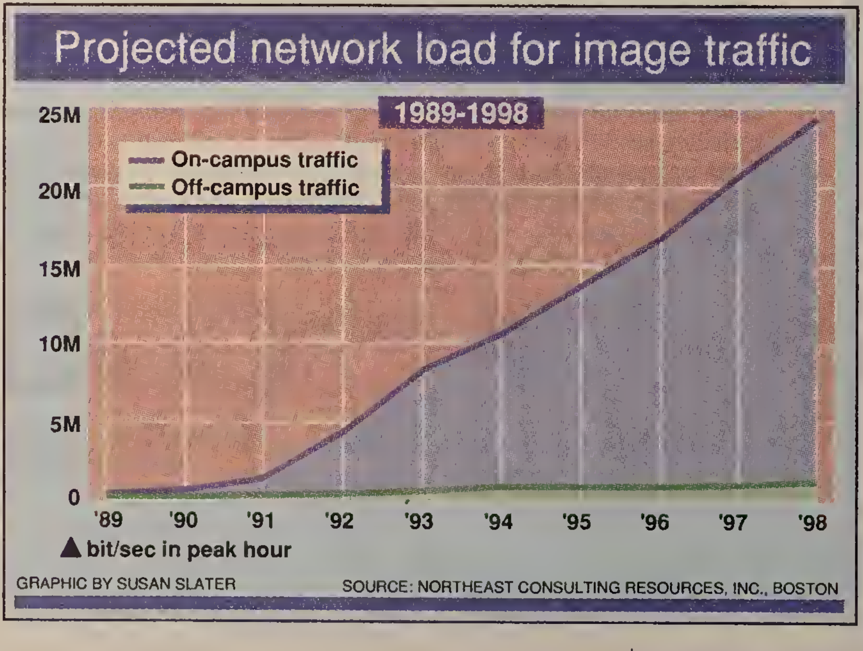
Others, such as the University of Iowa Hospitals and Clinics in Iowa City, are conducting quality tests to measure the diagnostic value of images vs. film. Still others, such as the University of Kansas in Lawrence, Kan., have conducted network requirement studies that are being used to drive the standards efforts.

The quality issues remain difficult to assess. Medical images vary dramatically in terms of resolution and data transmission requirements.

A single MRI image, which may consist of 256-by-256 pixels by 12-bit depth, can be transmitted across an Ethernet in five seconds. A single chest X-ray, which may consist of 2,000-by-2,000 pixels by 12-bit depth, requires 100M bit/sec Fiber Distributed Data Interface (FDDI)-based transmission speeds to provide adequate transmission.

For lower resolution scans, the benefits of PACSs are becoming obvious.

One Siemens test site, the Mallinckrodt Institute of Radiology in St. Louis, has already demonstrated that scans taken in one building can be transmitted to viewing screens in another building 1,000 feet away faster than the films can be processed and hand-carried. The institute, a heavy user of local-area network technologies, attached the PACS equipment to existing Ethernet facilities to link scanners, local storage devices and viewers between two buildings.


Projected network load for image traffic

GRAPHIC BY SUSAN SLATER

SOURCE: NORTHEAST CONSULTING RESOURCES, INC., BOSTON

Currently, most sites rely on a few high-performance multiscreen viewing units located in diagnostic reading rooms. These systems provide mouse-driven, pull-down menu interfaces that encourage reliance on the PACS and make it easier for physicians to learn the system. Future enhancements will include low-cost connections to personal computer-based viewing stations, which can be located in the physician's office.

Eventually, the PACS will interconnect with additional hospital information systems to provide robust information-based diagnostic and clinical care resources. Patient records with graphics information embedded in the files will be available on-line and across local networks to referring and consulting hospitals and physicians.

Eventually, patient records with graphics embedded in the files will be available on-line and across local nets to hospitals.

* * *

Teleradiology

Developments are also taking place to interconnect PACSs and to facilitate wide-area access to PACS data bases. Known as teleradiology, this type of technology is geared toward consultative, casual users rather than the high-capacity production environments of the medical center.

Some believe the widespread use of this high-capacity wide-area image transmission model is still five to 10 years away. Others point to the information management challenges confronting the modern physician and forecast widespread acceptance in four to five years.

AT&T is testing the Commview system, which provides resolution of up to 1,024-by-1,024 pixels by eight-bit depth, over dial-up connections at transmission speeds of 19.2K bit/sec and 64K bit/sec using Integrated Services Digital Networks. Many institutions, including Boston's Children's Hospital, are investing in entry-level Commview systems to link selected sites.

The speed vs. image quality trade-off has been a major issue during these tests. Some physicians find that the 2½ minutes it might take to transmit a 1,024-by-1,024 by eight-bit uncompressed image over a 19.2K bit/sec link is too long, given that a single exam may be made up of dozens of images. For the most part, users have resisted downloading files to workstations, although acceptance of nonsupervised transmission may come with more experience.

Compression techniques as high as 18-to-1 have been tested, but it is widely agreed that compression rates in excess of 2.6-to-1 erode the quality of the image beyond acceptable limits. The emergence of switched 56K bit/sec services and ISDN may overcome some user concerns, as early tests have shown that a single 1,024-by-1,024 pixel by eight-bit image using 2.6-to-1 bit compression can be transmitted over a 64K bit/sec ISDN B channel in 35 seconds.

Teleradiology transmissions will likely rely on lower resolution viewing devices than those attached to the PACS at hospitals and medical centers.

Rather than demanding the high-capacity transmission capabilities envisioned for the medical center campus, these applications will be supplied on an as-needed or on-demand basis. If the information is for reference rather than diagnostic purposes, this slower transmission time or slight reduction in image quality may be acceptable.

Technical and user considerations will slow the widespread use of teleradiology. Low-cost remote, personal computer-based viewers are just coming to market. However, the ways physicians review and manage patient data will change slowly as medical students who have been exposed to these capabilities at the medical science centers move into community-based practices.

"General practitioners will justify investment in image-viewing devices when they can also use them to schedule patient tests, access records and even send out bills," suggests Bob Carlton, vice-president of sales and marketing with AT&T Medical Diagnostic Systems in West Long Branch, N.J.

Carlton says he sees integrated physician workstation systems creating an important bond between referring physicians and medical institutions.

Referring physicians would benefit from teleradiology by receiving full text and image files on their patients quickly from the hospitals and diagnostic centers while being able to schedule new tests and check on other patients' status reports.

Experts agree that the creation of the fully networked hospital and the internetworking of independent medical centers, relying on a high-capacity fiber backbone, local Ethernets and high-speed wide-area networks, are still five to 10 years in the future.

However, they all believe that the networked medical environment is inevitable. Siemens' Roessel points to Japan, where government subsidies encourage use of PACSs, as a model for the future in the U.S.

> ''In 10 years, most medical schools will make use of 3-D data bases,'' Jessup predicts.
>
> ▲▲▲

''Japan supports more than 10 domestic PACS manufacturers and has over 50 PACSs already in place,'' Roessel says. ''American hospitals face more difficult cost containment issues, which are slowing the deployment of the technology here.''

Computer graphics

Another use for image-based capabilities is as enhancements to academic curriculums and surgical planning techniques.

Known as biomedical visualization, computer-based graphics generated by converting image scans to digital graphics data bases show promise. Projects using 3-D data bases, constructed from anatomical image scans, are now under way to support facial reconstruction, anatomical research, surgical planning and orthopedic appliance design.

Using existing computer-aided design and manufacturing technology to rotate, manipulate and construct 3-D graphics, researchers are now able to construct models of human organs and limbs that some believe are more useful for teaching and surgical planning than traditional research/teaching resources. Applications include:

- ■ 3-D models of human faces, which are used to plan reconstructive plastic surgery better.
- ■ Animated cardiac images, which are used to plan and evaluate techniques for open-heart surgery.
- ■ Customized, patient-specific design of artificial joints or prosthetics.
- ■ Improved dental impressions and dental implant design.

The images can be manipulated to simulate numerous what-if surgical situations, permitting the physician to evaluate potential difficulties that might arise during a surgical procedure. Because they are 3-D, the simulations assist the physician in assessing depth-perception problems that may result during actual surgery.

A grant soon to be put out for bid by the National Institute of Health will support the development of a 3-D data base of entire male and female bodies and stimulate use of 3-D biovisualization techniques throughout the country.

The project, expected to cost $5 million dollars and to take as long as five years, will provide a data base for researchers across the country.

These techniques will lead to improved depth perception among surgical students and will pave the way for sophisticated presurgical planning using patient-specific 3-D simulations, according to Marsha Jessup, adjunct associate professor and director of media resources for the University of Medicine and Dentistry of New Jersey — Robert Wood Johnson Medical School.

''In 10 years, most medical schools will make use of 3-D data bases,'' she predicts. ''Schools will adapt the national data base to their own specific curriculum needs and specialty practices.''

Today's 3-D biographics techniques are taking place in stand-alone environments. However, near-term requirements for lo-

(continued on page 43)

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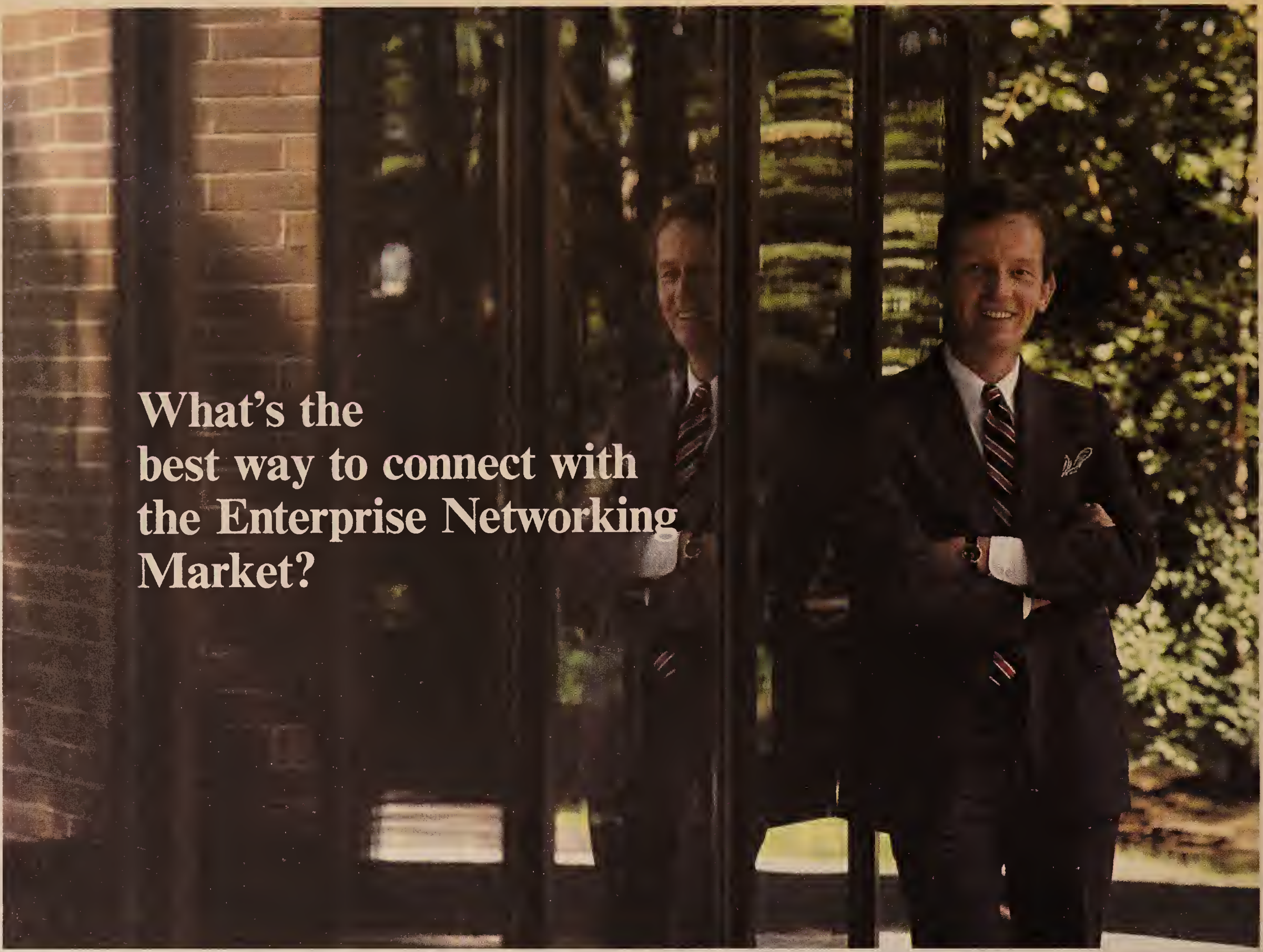
Gary Beach, Publisher, *Network World*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Answers for the Information Age.

(continued from page 41)

cal- and metropolitan-area networks between MRI scanning locations, diagnostic stations, research and teaching facilities, and physician offices can be forecast. Over the longer term, national referral and consultation networks may develop as researchers and surgeons share data on special cases.

Image and academics

The use of both flat and 3-D graphics will extend beyond the hospital/clinical care environment into the classroom. Already computer-aided learning programs and videodiscs are being used to reduce classroom time devoted to rote review of anatomy and pathology topics.

Dental schools hope to use computer-aided instruction to reduce the time required to directly supervise students in the practice of basic manual skills so that more time may be devoted to complex procedures and clinical supervision.

Using Hypercard and related data base programming tools, such as those being tested at the Laurie Imaging Center in New Brunswick, N.J., researchers and teachers are designing annotated anatomy and pathology teaching tools that link images and text into a single electronic document.

Annotations on the images are tied to detailed text providing specific information on each topic. A single click on any annotation calls up the related text, permitting the student to work through the topics at his or her own pace.

Network capacity

Each organization faces specific network requirements depending on the number of devices attached to the backbone, number of viewers, types of images most often used and geographic distribution of the user base.

Even conservative forecasts, which assume a very gradual transition of physicians' diagnostic preferences and assume use of local optical storage to reduce network transit of images, quickly lead to peak-hour transmission requirements that require fiber-based FDDI or metropolitan-area net technology.

As the graphic on page 40 shows, a typical 500-bed medical center hospital, generating 120,000 image exams of varying types, could generate annual, peak-hour, on-campus demands in excess of 20M bit/sec when 80% of the available images are networked. Larger institutions concentrating in high-resolution diagnostic areas or using 3-D images would generate even greater bandwidth requirements.

Local/campus communications resources will respond to this demand by creating a three-tiered communications architecture linking voice, data and image data bases across local-, wide- and metropolitan-area networks.

Individual on-campus sites will be linked via Ethernet to a high-capacity backbone that also interfaces with the image acquisition devices, central storage systems, central records data bases and time-critical viewing stations. Off-campus sites will connect via switched or dedicated links, depending on transmission quality and availability constraints.

Each institution will need to fine-tune its solutions to the specifics of its radiological practice, medical records format, student population, research affiliations and referral network.

For network planners in other industries, the solutions the medical science community develops may suggest strategies for supporting graphics-based engineering, electronic data interchange and customer service applications. ◘

Letters

continued from page 29

everybody, and the mainframe could not be all things to all users either.

Users depend on a variety of hardware, software, applications and communications gear for their diverse business needs. One-vendor solutions are not necessarily the best ones anymore.

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Gus Galatianos
President
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Getting graphic

continued from page 32

neous networks. The X Window System supports multitasking window management programs that provide a hierarchy of overlapping, sizable windows and an intuitive, consistent graphical user interface.

Adobe Systems, Inc.'s Display PostScript (DPS) — a screen-description language that works in any interactive, multiprocessor environment — and Sun's network-extensive windowing system (NeWS) environment are nearly identical but incompatible products that represent more advanced versions of the X Window System. NeWS was released more than two years ago and has been licensed by about 40 firms. DPS has been licensed by IBM and DEC, and will be part of NeXT, Inc.'s NeXT computer.

DPS can be used to manipulate complex, high-resolution, true-to-life images on any type of display monitor, regardless of size, resolution or color capability. It can also drive both PostScript- and non-PostScript-compatible printers.

DPS uses a higher level drawing set than the X Window System's graphics library with features such as primitives for describing rectangles and caching for frequently used objects, such as icons. While the conventional PostScript page-description language can take minutes to output an image to a printer, DPS can assemble an on-screen image in less than one second.

Sun is waiting for the market to catch up with its NeWS environment, according to Mary Rose Swatstek, Sun's network product manager. Once the simpler X Window System becomes popular, its users may see advantages to migrating to Sun's more powerful NeWS, she says.

DEC, HP, Sun and Apollo have joined forces to produce an extension to the X Window System called PHIGS/PHIGS+ Extension of X Window (PEX), which allows 3-D graphics files to be transferred in the X Window environment.

PHIGS (Programmer's Hierarchical Interactive Graphics System) and its extension PHIGS+ have become the de facto standard for transferring 3-D graphics files between incompatible devices. Prior to the development of PEX, PHIGS did not support windowing. PEX will be released in about one year.

"PHIGS+ is designed to allow users to create moving images, and it can handle a lot of different rendering styles and types like shading and lighting," Mathias says. "PHIGS+ and the X Window System are the closest things we have to standards in visualization today."

Software such as PHIGS, PEX, DPS, NeWS and RenderMan help to solve the problem of inadequate bandwidth by translating bit maps into higher order, more compact terms, effectively compressing data. PEX allows graphical data to be transmitted over a bandwidth that otherwise would have to be expanded by as much as four magnitudes to accommodate the same data in bit-mapped form.

"These techniques do help give you higher effective bandwidth performance, and we also use data compression for a lot of our image data," says M.W. Mantle, Pixar's director of 3-D graphics.

Because these protocols and standards dramatically reduce the need for bandwidth, the rate at which they are developed may well set the pace for graphical imaging networking, rather than the availability of network bandwidth itself.

However, these software tools apply only to computer-generated, bit-mapped images that are described in geometric terms, such as polygons and vectors. It may be years before standards can be developed for manipulation of images that are captured by cameras or scanners and are comprised of pixels or 3-D volume pixels. A draft of an imaging standard called the Programmer's Imaging Kernel may be released by early 1992.

The fate of high-end graphical applications will depend, in large part, on improvements in both network bandwidth capacities and networking software and standards.

As David Morse, an engineering network solution manager for HP in Ft. Collins, Colo., sees it, "Further down the road, I think some combination of data compression algorithms, compression technology and faster network speeds is going to be the answer."

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New CMC E-net adapters deliver fast performance

Firm says interface offers 10M bps throughput.

By Susan Breidenbach
West Coast Bureau Chief

SANTA BARBARA, Calif. — Communication Machinery Corp. (CMC) last week introduced two VMEbus Ethernet adapters based on a new architecture that boosts the performance of its intelligent interfaces.

The two new boards, the CMC-130 and CMC-135, are designed to plug into VMEbus-based systems, including Unix-based engineering workstations and network servers. CMC is also planning to use the technology on its other adapters, including those for Fiber Distributed Data Interface networks.

FXP, the new full-throughput architecture, segregates program and data memory on the coprocessor to help reduce competition for memory resources among the host, the board's CPU and the network interface. Throughput is further increased by providing two separate channels into the data memory.

CMC said the result is a network interface that will provide users with network throughput that approaches Ethernet's official data rate of 10M bit/sec. By contrast, "the maximum performance that even the high-performance Ethernet boards can achieve is about 3M bit/sec because various processes are contending for resources," said Ashok Dhawan, vice-president of product marketing and development for CMC.

The host, the board's CPU and the network interface all try to access the board's memory at the same time, and the board has to arbitrate among them. This slows all three processes down and makes it impossible for the adapter to pump data across the net at a speed approaching the full 10M bit/sec Ethernet, he said.

> A unique feature of FXP is its use of video DRAM for coprocessor data memory.
>
> ▲▲▲

FXP provides a separate program memory containing the network protocol software that the intelligent adapter needs to process. Only the board's own Motorola Corp. 68020 microprocessor can access the program memory, which it does by using a dedicated, internal bus.

A unique feature of FXP is its use of video dynamic random-access memory (DRAM) for the coprocessor's data memory. Designed to provide quick screen refresh in intensive graphics applications, video DRAM can be used to pump out large blocks of data over a net as well, CMC said.

There are two ways for system processes to access the video DRAM. A regular DRAM port is provided for the network interface and for general-purpose access by the host.

A second route to the video DRAM is a Sequential Access Memory (SAM) port. The SAM port supports 32-bit parallel access at 800M bit/sec, providing a very high-speed channel used to transfer data to and from the network adapter's memory. The use of two channels reduces contention among the host, the board's CPU and the network, CMC said.

The CMC-130 supports CMC's Transmission Control Protocol/Internet Protocol and Open Systems Interconnection networking software. The CMC-135 includes a link-level driver that CMC's customers can use to enable the board to support their own internally developed networking software.

The CMC-130 and CMC-135 FXP adapter bus systems are priced at $2,695 and $3,195, respectively.

Kodak chooses IBM to run, upgrade its DP operations

By Gail Runnoe
Washington Correspondent

ROCHESTER, N.Y. — Eastman Kodak Co. last week awarded IBM a contract to consolidate four data processing centers on its worldwide network into one center that will be owned and operated by IBM.

Kodak said the four processing facilities were outdated, and it opted to contract out the upgrade so it could focus its resources on its core business. IBM will build and operate the facility and sell DP services back to Kodak.

According to Alan Chase, group manager of products and services in Kodak's computing and telecommunications services unit, the company is also considering teaming with another partner to off-load some of its network operating tasks. "We're trying to look for creative and innovative ways to improve the network," he said.

Kodak hopes to upgrade its network using technologies such as 45M bit/sec fiber-optic T-3 facilities, Integrated Services Digital Network services and Fiber Distributed Data Interface local networks.

IBM won the DP consolidation project over rival bidder Electronic Data Systems Corp. Though the specifics of the two companies' proposals were not disclosed, Kodak said IBM's offer was a better fit.

With this contract, IBM will manage operations for about 50% of Kodak's major worldwide DP. Applications it will support include inventory control, sales, finance and administrative services, said G. William Brautigam, Kodak's director of the data center project.

While most of the hardware and software at the new facility will be manufactured by IBM, third-party equipment could be installed where applicable, said Harry Beeth, vice-president of IBM's National Service Division in Franklin Lakes, N.J.

The new center will be linked to Kodak's worldwide Systems Network Architecture net via a 405M bit/sec fiber-optic metropolitan-area network Kodak uses to support 17 sites in Rochester. The center will support thousands of Kodak employees.

Kodak's network connects points in the U.S., Europe, South America and the Far East, Chase said. It includes 20 major IBM SNA subnetworks, six of which are located in Rochester.

Tens of thousands of personal computers, minicomputers, workstations and process control computers from a variety of vendors — including Hewlett-Packard Co., Digital Equipment Corp. and IBM — are supported by the net, Chase said.

Under the deal with IBM, Kodak will retain control of its corporate network while some of the processors used to supply processing power will be operated by IBM. "We will treat the net like an application that will run on the IBM mainframes," Chase said.

Kodak expects to achieve significant cost and service benefits by handing off operation of the center to IBM, Chase said. "Management is not being delegated to IBM," he said, only the operation is. Kodak will continue to dictate what services IBM should provide.

Chase said Kodak wanted a partner to take over the operational function because the company "wanted to be more creative in how [it handled] critical business functions."

Since the beginning of the year, Kodak signed two smaller but similar agreements with other companies.

In January, Kodak sold its voice-messaging system to Tigon Corp. and began purchasing

(continued on page 47)

MC plans image net strategy

continued from page 1

confirm charges and correct any errors.

Image transmission replaces the need to mail charge slips between banks, a cumbersome process that often delays the resolution process to the legal limit of six months.

Image transmission will also reduce errors associated with requesting charge slips from the merchant's bank, helping customer banks avoid the $10 fee to request the correct one.

Banks are seeking a quicker way to resolve disputes because government rules prevent the customer's bank from collecting from the customer — and the merchant's bank from crediting the merchant's account — while a charge is in question, said Christopher Poole, director of MasterCom.

Under MasterCard rules, a customer often does not have to pay for a charge if the merchant's bank cannot supply a copy of the charge slip within 21 days. The customer's bank can then file a request to recover the money it paid to the merchant on behalf of its customer, a process known as chargeback. The customer's bank can also attempt to charge back the merchant's bank while it disputes the accuracy of a charge.

"Somewhere between 20% and 25% of all the chargebacks are because the card-issuing bank asked for a copy of the charge slip the customer signed and [the card-issuing bank] claims it never got it," Poole said.

Poole said that while a merchant's bank has 21 days to supply a charge slip, one is usually supplied within 14 days. With MasterCom, Poole said that time will be cut to four days.

Poole said MasterCom has been used by a handful of banks since March and that he expects 83% of MasterCard member banks to be using it by September.

Daily bread

With MasterCom, a host computer at the merchant's bank receives daily credit transaction and administrative messages from Banknet. Software running on that host detects charge slip requests and transmits them to a MasterCom workstation.

The MasterCom workstation consists of an Intel Corp. 80386-based microcomputer equipped with a Hewlett-Packard Co. ScanJet tabletop scanner and AST Research, Inc. TurboLaser laser printer. MasterCard developed software for MasterCom in conjunction with TRW Financial Systems, Inc.

The merchant's bank scans into the scanner a copy of charge slips made from microfilm or the original slip. The workstation reads the account number from the charge slip image file and matches it to the account number contained in the request. Alternatively, an operator can view the image on screen and manually enter the account number.

The workstation transmits images to the bank's MasterCard Interface Processor, typically an IBM Series/1 minicomputer, via a dedicated 9.6K bit/sec line supporting IBM's Binary Synchronous Communications protocol. The Series/1 acts as a message switch and packet assembler/disassembler linking the bank to the nearest Banknet packet switch.

Banknet delivers the images to a MasterCom workstation at the customer's bank, which can view the image and decide whether it is acceptable or not.

If it is accepted, the image is used to settle the dispute with the customer. If it is not, the image is sent to MasterCard's Operations Center in St. Louis. MasterCard reviews the dispute and sends, via Banknet, a message to both banks informing them of its decision, to which they both must adhere, Poole said.

Murray airs LAN Mgr. strategy

continued from page 4

front-end product using it called FileShare from Saros [Corp. of Bellevue, Wash.] It represents an entirely new class of application, like one of those teaser applications that came out on the Macintosh in the early days.

We need a rush of Saros types of products for LAN Manager so that people can see what we mean by distributed client/server computing and why Microsoft provides a better platform for such applications than other vendors.

Is there any truth to the rumors that Microsoft is considering selling LAN Manager directly to users?

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What can you do to help orchestrate OEM efforts and turn LAN Manager into a success?

We need to make sure our OEMs are bringing LAN Manager products to market and integrating LAN Manager into their own complex product lines. When you consider our entire list of LAN Manager OEMs, we have the world's largest network sales force working for us. IBM, DEC, Hewlett-Packard and a lot of others are saying, 'This is our LAN product.' But we have to help them see the product as something they can sell to enhance their own businesses.

These large OEMs can also offer worldwide service to multinational corporations, which gives LAN Manager an advantage over NetWare.

Rival slaps COMSAT with suit

continued from page 8

"They have illegally monopolized the market by price fixing and conspiring to block competition," he continued. "We want to bust open their monopoly."

PAS said that COMSAT and its INTELSAT counterparts — mainly post, telegraph and telephone administrations — have tried to run it out of business by boycotting its services.

PAS also charged COMSAT with misleading PAS' customers about its ability to obtain operating agreements in foreign countries.

Competition heats up

PAS became the first private carrier to offer international satellite service in competition with COMSAT and INTELSAT in June 1988, when it launched its PAS-1 satellite.

The satellite began service last September.

The company boasts that its satellite network is more powerful than INTELSAT's net and allows users to employ smaller, less expensive earth stations than are needed with the INTELSAT system.

According to an executive with Vitacom Corp., a Mountain View, Calif.-based provider of satellite networks for multinational businesses, PAS' services have enabled Vitacom to offer systems at a lower cost than would be possible with INTELSAT.

"The introduction of competition in the satellite market is a positive thing for the customer," said Chris Hoebich, Vitacom's chief financial officer. "We'd be interested in seeing more of it."

Orion Networks Systems, Inc. recently received approval to battle INTELSAT for the transatlantic satellite market, thanks to an INTELSAT Assembly of Parties decision made earlier this month (see "INTELSAT approves plans for Orion's net services," page 9). Orion plans to launch two transatlantic satellites and go after the U.S. and European market for private network users.

GTE-HSN may go to jury this week

continued from page 4

has been harmed by HSN's allegations.

HSN reported earlier this month its first-ever quarterly loss, largely the result of $5.4 million in third-quarter legal expenses for the GTE case.

In its third fiscal quarter, ended May 31, HSN lost $5.9 million, compared with earnings of $6.4 million in the corresponding period a year earlier. HSN also reported a slide in sales from $183.2 million in the third quarter last year to $178.7 million in the comparable quarter this year.

More at stake

Although HSN and GTE have the most at stake in the trial, other network users and vendors are keeping an eye on the case.

While the case could be an issue of basic fraud, it could also create precedents regarding vendor liability. Utilities have traditionally enjoyed limited liability in cases of network service failures, but the fact that GTE also provided HSN with network equipment adds a twist to that scenario, industry watchers said.

"The outcome of the case could have a significant bearing on telecommunications users if HSN were to win because other users might follow with similar suits," said Donald Kimberlin, a telecommunications consultant based in Safety Harbor, Fla.

Kodak chooses IBM to run DP

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voice-messaging services from the company. Earlier this month, Kodak named Businessland, Inc. its preferred supplier of microcomputer systems, software, peripherals and technical support services.

"We've been migrating down this [partnership] path," Chase said. "It's a theme we're very interested in."

Within the next 60 days, IBM will take over management of the four DP centers and will offer positions to 300 Kodak employees. Transition to the operation of the new center is expected to take 18 months to two years, according to David McDowell, president of IBM's National Service Division.

Precise terms of the agreement were not disclosed.

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Software supports OS/2

continued from page 2

opens up a huge new market for SQL Server.

However, the initial NetWare support only provides for communications between OS/2 workstations. Front-end applications running on DOS workstations will not be able to access the SQL Server across a NetWare local network until Novell builds Named Pipes support into its DOS workstation shell.

Danny Brand, manager of OS/2 products for Novell, said such support would be available by the end of the year.

One interesting feature of the Novell Named Pipes implementation is that only the OS/2 shell software — and appropriate network interface hardware and cable — is required to create an SQL Server network. OS/2 workstations can communicate with the SQL Server without the presence of a NetWare server.

This gives SQL Server workgroups that don't require NetWare file and print services a low-cost option, particularly since Novell is charging corporate users a onetime license fee of $200 for unlimited copies of the NetWare Requester for OS/2 1.1. Users of Version 1.0 of the requester can obtain a free upgrade until the end of November 1989.

On a press tour last week, Novell Executive Vice-President Darrell Miller said the new OS/2 requester was the first part of a four-phase implementation of OS/2 support that would demonstrate "a heavy Novell commitment to OS/2."

The new requester will be followed in the first quarter of 1990 by a version of NetWare that runs on top of the current generation, 16-bit OS/2 operating system.

The NetWare Requester for OS/2 Version 1.1 requires NetWare 2.1 or higher. It will also work with NetWare 386 Version 3.0, which is scheduled to be released in September.

Arinc tests airline safeguards

continued from page 8

ground radio communications system called the Arinc Communications Addressing and Reporting System, which airlines use for voice and data radio communications between planes and airline headquarters.

The services the company plans to pilot test this year promise to extend the reach of these networks. One example is the satellite communications system for transoceanic flights.

Flight finder

According to Angus McEachen III, Arinc's senior director of radio services, the only way transoceanic flights are tracked today is by having pilots radio in their position once every 45 minutes.

Transoceanic flights extend beyond the range of regular air traffic radar and other tracking systems. Voice communications are kept to a minimum because the transoceanic radio airwaves are crowded.

Using the satellite connection, planes will automatically report their positions every five minutes. Communications will be broadcast from customized aircraft antennas via satellite to the Arinc terrestial network.

From there, the flight's position will be delivered via terrestrial links to air traffic control centers and airline headquarters.

By tracking planes more closely, the satellite system will let air traffic controllers reduce the space between planes, enabling more planes to share the transoceanic routes, according to David Haapala, director of flight standards and future programs at Minneapolis-based Northwest Airlines, Inc. Northwest plans to test the tracking system this fall.

Haapala added that the satellite tracking system will let air traffic controllers, for the first time, tell pilots on transoceanic flights when they make navigational errors.

According to McEachen, United Airlines, Inc. also plans to test the satellite tracking system.

Weather net

Later this year, Arinc also plans to cut over dedicated links to the weather forecasting centers of the National Weather Service in Suitland, Md., and the U.K.'s national meteorological service in Bracknell, England.

The links will be used to communicate weather data gathered by planes in flight to each country's weather services, giving the services more timely and accurate data, McEachen said.

Today, the weather services obtain atmospheric conditions by launching balloons twice daily. "Obviously, gathering information from planes would give them a much richer data set to work with," McEachen said.

Blue-sky EDI

Arinc also plans later this year to use its terrestrial net to offer an EDI service between airlines and the U.S. Customs Service. The link, called Communications for the Automated Manifest System, will be used to let airlines electronically file paperwork for imported air freight with U.S. Customs.

According to Robert Covell, an Arinc senior director of data services, filing documents electronically will help airlines speed goods through the lengthy customs approval process.

"Right now, when goods arrive, customs agents have to pore through paper documents," he said. "Sometimes, this can tie up goods for 10 days."

US Sprint says AT&T lured user

continued from page 1

dling equipment and services, US Sprint said AT&T priced its SDN services below tariffed rates. Offering below-tariff prices would violate several provisions of the Communications Act of 1934 that prohibit carriers from deviating from their tariffs and discriminating between customers, according to US Sprint.

Leon Kestenbaum, counsel at US Sprint, said officials at the company feel the SCI agreement is not an isolated case and that AT&T appears to be bundling equipment and services. "I can't believe that this [agreement] is completely different from what AT&T does in other situations," Kestenbaum said.

US Sprint asked the FCC for damages to compensate for the lost business. Although US Sprint did not specify the amount it is seeking, the carrier said it would base its request on the value of the SCI business. Kestenbaum said the company had lost about $9 million worth of SCI business.

In addition to damages, US Sprint asked the FCC to require AT&T to inform SCI in writing that it need not subscribe to AT&T's transmission services in order to obtain the equipment at reduced prices.

The carrier also asked the FCC to require AT&T to include a statement in all advertising for the next two years stating that customers of AT&T equipment are free to choose another carrier for long-distance services.

AT&T has 30 days to respond to the allegations, after which FCC staff members can ask for more information. About 99% of formal complaints are decided on the basis of this information on the record, according to FCC records, but if there is a question about facts in the case or the credibility of a witness, it could be referred to an administrative law judge at the FCC for a hearing. Formal complaints typically take 18 months to complete.

> Offering below-tariff prices would violate several provisions of the Communications Act.
>
> ▲▲▲

Kestenbaum is optimistic that the FCC will rule in US Sprint's favor since the legal issues are almost identical to the earlier promotional tariff in which AT&T's conduct was found unlawful.

Although he concedes he isn't aware of another instance in which the FCC has awarded a multimillion-dollar damage decision, Kestenbaum said he has proof in the form of affidavits from three US Sprint salespeople saying SCI told them they would have to match an offer from AT&T involving reduced cost or free equipment. The affidavits quote SCI officials as saying SCI would only get the equipment discount if it bought AT&T service.

A Washington attorney not affiliated with US Sprint and who asked not to be named said the carrier has a strong case against AT&T. He said the letters and affidavits supplied by the carrier make a compelling case that AT&T acted illegally.

The attorney said it is possible that AT&T will decide to settle the complaint with US Sprint privately. AT&T sometimes settles if the opponent has a strong case that would set a negative precedent.

However, Victor Toth, a telecommunications attorney in Washington, said he believes US Sprint will have a difficult time winning its case. "I think US Sprint's case is a little bit strained," he said. In past cases, the FCC has sometimes allowed the provision of reduced prices or free equipment, so long as the equipment isn't subsidized by the regulated service, he said.

E-mail poses legal issues

continued from page 1

ment systems to see if the same rules apply," said Walter Ulrich, a consultant at Arthur D. Little, Inc. in Cambridge, Mass., and a board member of the Electronic Mail Association.

Erased tapes

In the case of Exxon, the company received a federal court order in March to preserve all records that may relate to the oil spill in Prince William Sound. But in June, an Exxon computer operator inadvertently erased computer tapes containing important electronic information related to the spill.

The operator failed to heed a memo issued shortly after the spill asking all employees not to destroy electronic files. Instead, the operator followed Exxon's standard operating procedure of reusing backup tapes that had been in storage for a month.

Alaskan investigators are now questioning Exxon employees to determine whether the destruction of those tapes resulted from negligence and whether other copies of the documents exist, as Exxon claims.

Although Exxon was following standard procedure, the incident dramatizes the important role electronic documents and messages can play in corporate operations.

In establishing records management policies, companies have to contend with conflicting interests: the need, on the one hand, to save copies of electronic files and messages for reference and, on the other hand, the desire to destroy files to minimize chances that they be used against the firm in a lawsuit.

Companies attempting to establish records management policies for electronic documents and messages should consult the Electronic Communications and Privacy Act of 1986, said Jonathan Wallace, a New York attorney specializing in computer-related issues.

The act lays down rules governing the procedures that law enforcement officials must follow before seizing electronic documents and rules about employees' E-mail privacy rights.

Unfortunately, few companies are aware of the act and its legal implications, Wallace said.

Under the law, the police need a search warrant to obtain electronic documents that have been stored for less than six months. But thereafter, the authorities only need a subpoena to retrieve electronic documents.

As a result, it may make sense to retain electronic records for six months, Wallace said.

One organization that has established a six-month retention policy is the American Bar Association (ABA), which runs its own E-mail network called ABAnet. ABA officials have instructed the vendor that operates ABAnet, iNET of America, to destroy all electronic files after six months.

Big Brother is listening

Companies also need to realize that, under certain conditions, the Electronic Communications Privacy Act makes it illegal for employers to read electronic messages written by their employees.

Under the act, employers are prohibited from reading electronic messages if the company's E-mail system leads users to believe their messages are private.

According to Wallace, many companies are in potential violation of the act because they mislead users into thinking they are the only ones who can access their messages. With most systems, adminstrators can read E-mail messages without much difficulty, Wallace said.

To avoid legal hassles, employers need to dispel the notion of the privacy of E-mail, Wallace said. Employers should frequently broadcast messages indicating that messages are not private, and systems programmers should remove all privacy options from the system, he said.

The monitoring of E-mail messages is more prevalent than most people realize, Wallace said. Such behavior is in keeping with the current trend of monitoring employees through drug tests, lie detectors and calculating keystrokes per hour for data-entry personnel, he said.

AT&T draws fire for rate cut proposal

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — AT&T came under fire last week for its recent proposal to cut T-1 and T-3 rates by amounts that would exceed the price floors established under the FCC's new price cap rules.

MCI Telecommunications Corp., US Sprint Communications Co. and the National Telecommunications Network asked the Federal Communications Commission last week to reject AT&T's rate reductions, which were filed earlier this month and are scheduled to take effect Aug. 24.

The new rates could save certain T-1 users 34% on current monthly rates and save some T-3 users as much as 42% ("AT&T cuts rates on digital private lines," *NW,* July 17). AT&T also restructured its Multi-Service Volume Pricing Plan to yield discounts of up to 50%.

Price cap regulation, which went into effect July 1, mandates that price increases and decreases be no more than 5% for any one service. The price decreases AT&T is proposing for T-1 and T-3 services, both of which are in the private-line category, average out to more than 5%.

The price cap rules allow AT&T to reduce prices below the 5% floor, but the carrier has to offer additional cost support information and give the Federal Communications Commission 45 days to review the prices before they can take effect. For price changes within the 5% limit, AT&T need only give the FCC 14 days' notice.

MCI claims AT&T failed to provide enough cost data, making it impossible to determine if the new rates are priced in a predatory manner. The carrier also complained that AT&T's filing was unreasonably vague and ambiguous.

MCI said the filing will be a test case because it is the first major tariff revision with rate reductions falling below the price floors imposed by the price cap rules.

It will now be clear whether the FCC is going to treat price caps as an alternate form of regulation or as "a vehicle to assist the agency in further deregulating AT&T," MCI said.

US Sprint also criticized AT&T's filing, claiming it failed to prove that the services are not priced below cost.

The National Telecommunications Network agreed with the other carriers that AT&T "supplied virtually no price support information." ◪

DEC discusses VAX strategy

continued from page 2

wards them via DECnet to a VAX running Rdb, which can either download Rdb data to satisfy that request or invoke Vida commands to retrieve host-resident data.

"Our ability to pull data from very different platforms using Rdb is the first major step toward a complete solution for integrating information across the enterprise," said Hans Gyllstrom, manager of DEC's data base systems group.

DEC will enhance Rdb to support distributed data management.

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DEC also said it will enhance Rdb to support a true distributed data management architecture that will allow users to store pieces of a single data base on multiple machines on a network.

Gyllstrom said DEC will develop a true distributed DBMS once it finishes work on a two-phase commit protocol within the next year. The protocol ensures that updates are reflected where necessary in a distributed data base.

Today, DEC can support a form of distributed data management with its VAX Data Distributor software. This package automates the process of distributing data to remote sites at the beginning of the day and collecting the changes at the end of the day. ◪

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B-2 flies through design stage

continued from page 1

applications for the network.

Because of the top-secret nature of the B-2 program, Northrop was required to build a separate network to handle B-2 information and to use government-issued encryption devices to secure the data. The network supports voice and allows users to transmit computer-aided design and manufacturing data as well as text files, electronic messages and other information.

The network consists of 10 T-1 lines, six 56K bit/sec lines and four 9.6K bit/sec lines connecting suppliers nationwide to Northrop's B-2 Division here.

From the beginning, Northrop required its major subcontractors — including The Boeing Co. and LTV Aircraft Products Group — to install an IBM computer-aided design and manufacturing network. These networks consist of IBM 3090 mainframes and IBM computer graphics terminals running proprietary Northrop CAD software.

Master data base

The networks enable Northrop to maintain an up-to-date master data base of all B-2 engineering designs. Each night, Northrop updates its master data base by compiling finalized design revisions made during the day. It then downloads a copy of the revised master data base to each subcontractor's mainframe, ensuring that all B-2 engineers work from identical, up-to-date designs.

Engineers can also transmit design files across the wide-area network to other engineers for comment. Once design revisions are approved by the appropriate authorities, the file is placed in the master data base in the IBM host at Northrop's B-2 headquarters here.

"We recognized early on that it would be more practical to link B-2 designers through a network than bring them all to one place," said Jeff Mirich, manager of CAD/CAM systems at Northrop's B-2 Division.

> The networks enable Northrop to maintain an up-to-date data base of all B-2 engineering designs.

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Direct factory link

At the beginning of the B-2 project, Northrop developed proprietary software that allows machine tools to produce parts directly from CAD designs. This software eliminated the need to create prototypes, a standard procedure in most manufacturing processes that can introduce design errors, Mirich said.

The software translates three-dimensional computer designs into numerical control programs used to run production machine tools that craft airplane components from raw materials.

By going directly from CAD drawings to the manufacturing of production tooling and parts, Northrop has been able to build the B-2 faster and at a lower relative cost than it could have otherwise.

While each B-2 is projected, on average, to cost $274 million, that figure is only 20% more than the amount it took to build each B-1 bomber, according to Northrop officials. By contrast, the B-1 bomber cost 160% more to build per plane than the previous generation aircraft, the B-52 bomber.

Northrop engineers can download numerical control programs to the computers that run the machine tools. The tools are also connected (usually via 9.6K bit/sec lines) to IBM hosts at subcontractor sites, enabling engineers to design parts and initiate production.

Northrop can transmit these numerical control programs to other suppliers and subcontractors on-line, or it can ship a paper punch tape or magnetic tape to suppliers that are not on the network.

Final review

The CAD/CAM network has also enabled Northrop to establish a formal review system that has improved component designs and reduced fitting errors during assembly.

Under the system, engineers from different departments — design, manufacturing, quality assurance and others — are required to evaluate and approve all designs before they are sent to the factory floor.

This has given manufacturing engineers, for example, the chance to identify designs that cannot be fabricated with existing equipment and suggest ways to make designs more efficient.

As a result, the review system generates more efficiently designed parts that are less apt to contain engineering flaws and slow down the manufacturing process.

Instead of gathering in one place to review a hard-copy design — a virtually impossible feat for each plane component — engineers simply use their graphics workstations to call up the designs under evaluation.

"We have changed our policy, procedures and design methods to really take advantage of what computer graphics can provide," Mirich said.

Calendar

Aug. 7-8, San Francisco — Troubleshooting & Maintaining the IBM PC, XT, AT, PS/2 & Compatibles. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015; (201) 478-5400.

Aug. 9-11, Vancouver — First International Congress of EDI Users. Contact: Electronic Data Interchange Association, Suite 550, 225 Reinekers Lane, Alexandria, Va. 22314; (703) 838-8042.

Aug. 9-11, Los Angeles — Network Cabling & Wiring Techniques. Contact: Integrated Computer Systems, 6053 W. Century Blvd., Los Angeles, Calif. 90045; (213) 417-8888.

Aug. 10-11, San Francisco — Time Line 3.0 Workshop. Contact: Symantec Corp., 505 B San Martin Drive, Novato, Calif. 94945; (415) 898-1919.

Aug. 14-15, Urbana, Ill. — 32nd Midwest Symposium on Circuits and Systems. Contact: Coordinated Science Laboratory, 1101 W. Springfield Ave., Urbana, Ill. 61801; (217) 244-0577.

Aug. 14-15, Albany, N.Y. — Understanding Data Communications. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015; (201) 478-5400.

Aug. 14-16, Philadelphia — Planning an EDP Disaster Recovery Program. Contact: Computer Security Institute, 360 Church St., Northborough, Mass. 01532; (508) 393-2600.

Aug. 17-18. Minneapolis — Understanding ISDN. Contact: Telecommunication Research Associates, P.O. Box A, St. Marys, Kan. 66536; (913) 437-2000.

Aug. 17-18, Philadelphia — Computer Viruses, Trojan Horses & Logic Bombs: Strategies for Protection. Computer Security Institute, 360 Church St., Northborough, Mass. 01532; (508) 393-2600.

Aug. 17-18, San Jose, Calif. — IBM's Systems Application Architecture. Contact: Gen2 Ventures, Suite D-5, 12930 Saratoga Ave., Saratoga, Calif. 95070; (408) 446-2277

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